



Comments on:

WD Revision of R 106- 1 & 2 Rail-weighbridges (Dec 2005)

Secretariat:

TC9/SC4 – Automatic weighing instruments - UK

Member	Clause	Comment	Secretariat comments
Australia			
Austria	General	Do we need different accuracy classes for wagon and train mass, if we hardly refer to the classes A to D?	Amended. Accuracy class for train deleted.
	2.4	Proposed wording: "... shall only be used for static testing during metrological controls..."	Amended.
	3.2.6 5.1.3	Does this point imply, that automatic rail-weighbridges can be constructed according to the requirements for NAWI of class III or IIII? If yes, would it be necessary to extend Table 3 regarding the scale intervals?	For static weighing test only.
	3.11.5	Shall the descriptive markings on the programmable display be shown on request of be permanently displayed? It could be useful to have permanent information on d (e), Min and Max.	To be displayed as long as the instrument is switched on.
	R106-2 General	The accuracy classes of train and wagon have been mixed up In the report there are 6 accuracy classes whereas in Part 1 only 4 classes are mentioned.	Amended. Accuracy class for train deleted.
		For the Pulse voltage the unit is missing.	
		We would prefer the diagram of R106-2 1997 for eccentricity tests for practical reasons during in situ tests.	Amended.
		Capitals (D,...F) are used in the report format whereas in Annex B lower case letters are used. The capitals - in our opinion - lead to confusion with the accuracy classes.	Amended.
Belgium			
Brazil			
China	T.3.1.2	<u>This clause should be added into :</u> <u>T.3.1.2.1 Axle partial weighing</u> <u>Weighing a wagon for each axle weight on the same load receptor The results are automatically added to indicate or print the wagon weight.</u>	Inserted in T.3.1.10. Worded differently.
	T.3.2.1	"The largest mass that an instrument is designed to weigh-in-motion without totalizing." <u>should be changed into:</u> <u>"The largest mass that an instrument is designed to weigh-in-motion of single load receptor or multiple load receptors without totalizing"</u> <u>Reason: weigh-in-motion may be totalizing all single load receptors. for full-draught weighing.</u>	Single load receptor redefined in T.2.3.1.

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China	T.3.3.1	“The largest in-motion weight that an instrument is approved to for a particular site.” should be changed into: “The largest wagon in-motion weight that an instrument is approved to for a particular site.” Reason: The clause is "Maximum wagon mass"	Amended.																												
	T.3.5.1	“(s _{max})” should be changed into:” <u>V_{max}</u> ” Reason: Same with other OIML Recommendation, such as OIML R134 etc..	Amended.																												
	T.3.5.2	“(s _{min})” should be changed into:” <u>V_{min}</u> ” Reason: Same with other OIML Recommendation, such as OIML R134 etc..	Amended.																												
	T.3.8 Final weighing value	“Weighing value which is achieved if the instrument is completely in rest and balanced and there are no disturbances taking effect on the indication” This clause should be cancelled. Reason: There is T.4.2.2 Intrinsic error” The error of an instrument determined under reference conditions. [VIM 5.24]”	Amended. Applies to static weighing test only.																												
	2.1.2	The definition of Train mass accuracy degree is not integrated. Only on the base of Form 1,Form 2 and Diagram 1, Train mass accuracy degree cannot be integrated to define.	Amended. Accuracy class for train deleted.																												
	2.1.2 Train mass	<p>For determining the train mass, WIM instruments are divided into four accuracy classes:</p> <p style="text-align: center;">A B C D</p> <p style="text-align: center;">2</p> <p style="text-align: center;">Table 2</p> <table><tr><th colspan="2">Percentage of mass of wagon or train, as appropriate</th></tr><tr><th>Initial verification</th><th>In-service</th></tr><tr><td>±0.10 %</td><td>±0.20%</td></tr><tr><td>±0.25 %</td><td>±0.50%</td></tr><tr><td>±0.50 %</td><td>±1.00%</td></tr><tr><td>±1.00 %</td><td>±2.00 %</td></tr></table> <p style="text-align: center;">□</p> <p style="text-align: center;">Table 2</p> <table><tr><th rowspan="2">Accuracy class Wagon</th><th colspan="2">Percentage of mass of wagon or train, as appropriate</th></tr><tr><th>Initial verification</th><th>In-service</th></tr><tr><td>0.2</td><td>±0.10 %</td><td>±0.20%</td></tr><tr><td>0.5</td><td>±0.25 %</td><td>±0.50%</td></tr><tr><td>1</td><td>±0.50 %</td><td>±1.00%</td></tr><tr><td>2</td><td>±1.00 %</td><td>±2.00 %</td></tr></table>	Percentage of mass of wagon or train, as appropriate		Initial verification	In-service	±0.10 %	±0.20%	±0.25 %	±0.50%	±0.50 %	±1.00%	±1.00 %	±2.00 %	Accuracy class Wagon	Percentage of mass of wagon or train, as appropriate		Initial verification	In-service	0.2	±0.10 %	±0.20%	0.5	±0.25 %	±0.50%	1	±0.50 %	±1.00%	2	±1.00 %	±2.00 %
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	2.3	should be added into: “The scale intervals of the indicating or printing devices shall be in the form of 1 x 10 ^k , 2 x 10 ^k or 5 x 10 ^k , "k" being a positive or negative whole number or zero.” Reason: The form of scale interval should be located here.	Amended. Inserted in 2 nd paragraph of 2.3.																												

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China	3.2.6	<p>"In addition to complying with the requirements of OIML R76 Bibliography [3] for class III or class IIII non-automatic weighing instruments, an instrument that can operate in a non-automatic mode "</p> <p>② "class III " should be changed into: "<u>class III</u> "</p> <p>Reason: There is Table 3 "numbers of scale intervals" in accordance with class III</p>	Amended.							
	3.11.2.1	<p>S_{max} should be changed into: "<u>V_{max}</u>". Reason: same as above.</p> <p>S_{min} should be changed into: "<u>V_{min}</u>". Reason: same as above.</p>	Amended.							
	5.1.3	<p>Class III should be changed into: <u>class III</u></p> <p>Class IIII should be changed into: <u>class IIII</u></p>	Amended.							
	5.1.3.2	The second "5.1.3.2" should be modified to "5.1.3.3" and the reference of "5.2.3" and "6.4.1" should be modified, too.	Amended.							
	6.1.3	<p>An instrument constructed only for partial weighing of two-axle wagons may be used as the control instrument</p> <ul style="list-style-type: none"> it ensures the determination of the conventional true value of the static two-axle reference wagon mass... <p>should be changed into:</p> <p>An instrument constructed only for partial weighing of two-axle (or two-bogie) wagons may be used as the control instrument ...</p> <ul style="list-style-type: none"> it ensures the determination of the conventional true value of the static two-axle (or two-bogie) reference wagon mass ... <p>Reason: In china, two-bogie wagons are usually used as the reference wagons</p>	Amended. Now 3.10.2.							
	6.4.2	" $n \leq 10$ " should be changed into: " <u>$5 \leq n \leq 10$</u> "	Amended.							
	A.5.2.4	The clause of A.5.2.4 should be modified, according to R76. The sentence ".....One of the weights shall be replaced equal to 1.4 d on the load receptor....." should be replaced by the sentence ".....One of the additional weights shall be replaced and a load equal to 1.4 d shall then be gently placed on the load receptor.....".	Amended.							
	A.7.3.1	<p>In Tabel 11 of A.7.3.1, the sentence "Interruption from reference voltage to 0 % of reference voltage for two half cycles" should be modified to "Interruption from reference voltage to 50 % of reference voltage for two half cycles".</p> <p>As a reference, R76 is already renewed to the text following:</p> <table> <tr> <td>Reduction</td><td>100 %</td><td>60 %</td><td>30%</td></tr> <tr> <td>Number of cycles</td><td>0,5</td><td>5</td><td>250</td></tr> </table>	Reduction	100 %	60 %	30%	Number of cycles	0,5	5	250
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China	A.9.3.2.3	Whether the formula of “A.9.3.2.3 (20 2(2)” is error or not? The “3” and “5” in the formula should be same.	A.9.3.2.3 deleted in accordance with other comments
	B.3	The label of “ 2), 3)” in B.3 should be modified to “1), 2)”. Amended.	
	Meaning of symbols	<p> <i>I</i> = Indication <i>I_n</i> = <i>nth</i> indication <i>L</i> = Load ΔL = Additional load to next changeover point $P = I + \frac{1}{2} e - \Delta L$ = Indication prior to rounding (digital indication) $E = I - L$ or $P - L$ = Error MPE = Maximum permissible error EUT = Equipment under test All the symbols should be italics as: <i>I</i> = Indication <i>I_n</i> = <i>nth</i> indication <i>L</i> = Load ΔL = Additional load to next changeover point $P = I + \frac{1}{2} e - \Delta L$ = Indication prior to rounding (digital indication) $E = I - L$ or $P - L$ = Error MPE = Maximum permissible error EUT = Equipment under test Reason: Symbols in ANNEX A of R106-1 are italics. </p>	Amended.
	Speed	<p> <i>S_{min}</i>, <i>S_{max}</i> should be changed into: <i>V_{min}</i>, <i>V_{max}</i> Reason: Same with other OIML Recommendation, such as OIML R134 etc. </p>	
Czech Rep.			
Finland			
France	General	<p>The introduction concurrently with 0,2, 0,5, 1 and 2 for wagon mass of classes A, B, C and D for the mass of trains is not justified here : wagon mass and train mass are the same quantity. Moreover, apart from paragraphs 2.1.1 and 2.1.2, reference to the letters A, B, C and D is made in the present draft to paragraph 3.11.2.1 (Markings) only, which restricts their necessity. For these reasons, it should be better to delete any reference to classes A, B, C or D.</p> <p>(In the 5th CD of Revision of R 134, the classes A, B, C and D are applied to axle loads and axle-group loads which are forces, while the classes 0,2, 0,5, 1, ... and 10 are applied to the total mass of the vehicle).</p>	Amended.
	T.1.3	The present paragraph is not a definition but a requirement concerning the characteristics of the weights to be used during metrological controls. So we propose to transfer the whole present paragraph in 5 and copy under T.1.3 the definition given in 2.19 of R 111-1 (2004).	Amended. Moved to 1 st par of 6.3.

Member	Clause	Comment	Secretariat comments
France	T.1.7	The present definition is applicable to NAWI and AWI. As there is no definition of automatic rail-weighbridges in the terminology, it would be better to put in place of the present paragraph the following : "T.1.7 Automatic rail-weighbridge An automatic weighing instrument having a load receptor, inclusive of rails for conveying railway vehicles, that determine the total mass of the wagon by weighing the railway vehicle in motion."	Amended.
	T.2.3	The present definition is not applicable when the rails of the load receptor include integrated load transducers and are inserted in the track without cutting of the rails at each ends. In order to avoid that such realisations which have been retained by several manufacturers are outside the scope of the revised R 106, the previous definition given in T.2.1 of R 106-1 (1997) shall be kept.	Amended.
	T.2.3.1 T.2.3.2	For automatic rail-weighbridges these definitions are applicable only in non-automatic mode, when the AWI is used as a control instrument. In order to avoid any misunderstanding, the definitions should be completed as follows : T.2.3.1 Single load receptor A load receptor that can support : <ul style="list-style-type: none"> • all the wheels of <u>an uncoupled</u> wagon simultaneously for full-draught <u>static</u> weighing, • all the wheels of an axle simultaneously for axle partial <u>static</u> weighing of <u>an uncoupled wagon</u>. T.2.3.2 Multiple load receptors ... for full-draught <u>static</u> weighing of <u>an uncoupled wagon</u> .	Amended.
	T.2.3.4 T.2.3.6	If these two definitions are justified for catchweighers and beltweighers, they are useless here and shall be deleted.	Amended. Definitions deleted.
	T.2.5.2	To be consistent with VIML, "Indicating device" should be put in place of "Indicator"	Amended.
	T.2.6	A paragraph "T.2.6.4 Control unit" shall be added: this device is a mandatory part of a WIM instrument when referring to 3.8.2.	3.12.2 amended. 'shall' replaced with 'may', and 'control unit' replaced with data processing module.
	T.3.8	It shall be necessary to specify that this definition is only applicable to static weighing and not to dynamic weighing.	Amended.
	T.7.3	To be consistent with this paragraph, a paragraph "Uncoupled wagon" should be added too.	Amended. 'Uncoupled' defined.
	T.7.4	In the title, "Train mass" shall be put in place of "total train"	Amended.
	2.1	The designations A, B, C and D being unsuitable (see General comments above), the whole present paragraph 2.1 (including 2.1.1, 2.1.2 and 2.1.3) shall be deleted and replaced by the paragraph 2.1 of R 106-1 (1997)	Amended. MPEs for train deleted.
	2.2.1	The whole paragraph shall be replaced by the paragraph 2.2.1 of R 106-1 (1997)	Amended.

Member	Clause	Comment	Secretariat comments
France	2.2.2	The Table 3 shall be numbered "Table 2" and the Note shall be deleted. Heading of the 1st column of table : Read "Accuracy class wagon ". In the 2nd column, line 2 read " $500 < m \leq 2\,000$ " and line 3 " $2\,000 < m \leq 10\,000$ ". In the present table 3, the heading "initial verification of the 3rd and all the 4th column (In-service verification) shall be deleted : anywhere in 5.2 (In-service verification), 5.3 (Subsequent verification) and 5.4 (In-service inspection) is specified that static weighing tests are to be carried out.	Amended.
	2.3	The Table 4 shall be numbered "Table 3" and the Note shall be deleted. Heading of the 1st column : Read "Accuracy class wagon "	Amended.
	2.7.2	The present drafting of the first paragraph is not consistent with 13;2 and 14.2.1 of D 11. We propose the following one : "An electronic instrument shall comply with the appropriate metrological and technical requirements, if the voltage of the power supply varies : <ul style="list-style-type: none"> - AC mains power supply : from U_{\min} - 15 % to U_{\max} + 10 %, - DC mains power supply : from U_{\min} to U_{\max}, - 12 V and 24 V road vehicle battery operated instrument : from 9 V to 16 V for 12 V battery, from 16 V to 24 V for 24 V battery, where U_{\min} and U_{\max} are minimum and maximum supply voltage marked on the instrument."	Amended.
	3.2.5	Such a paragraph don't exist in Recommendations (neither in their draft revisions) concerning the other AWIs. As there is no test method and no test procedure in Annex A which specify the test to be carried out to ensure the compliance of the instrument with the requirements of this paragraph 3.2.5, it seems to us that this paragraph should be deleted for avoiding endless discussions which may be result from the use of different statistical methods.	Amended. Paragraph was requested by Netherlands.
	3.2.6	An automatic weighbridge that can operate in a non-automatic mode may be either a NAWI or an AWI with an integral control instrument in the first case the weighbridge must comply with requirements of R 76 and R 106, when in the second case it shall only comply with the requirements of R 106. The wording of the present paragraph 3.2.6 seems to us not clear enough. We propose to put the paragraph 3.3.4 of R 106-1 (1997) at its place.	Amended.
	3.3	This paragraph is unsuitable to automatic rail-weighbridges and shall be replaced by the paragraph 3.3.5 of R 106-1 (1997) with the following additional sentence : " <u>A semi-automatic zero-setting device shall not be operable during automatic operation</u> ".	Amended.
	3.3.3	If such a paragraph is justified in R 76-1 and in 5 th CD Rev R 51-1, it is unsuitable here and shall be deleted. Moreover, for automatic rail-weighbridges, a tare device is not only useless but may facilitate the fraudulent use of the instrument.	Amended.

Member	Clause	Comment	Secretariat comments
France	3.4.9	For rail-weighbridges, the rails are the wagons guide device : consequently the first paragraph is useless and shall be deleted. The second paragraph should be kept under the title : “3.4.9 Direction of travel”.	Amended.
	3.4.10	Second paragraph, read : “... weighings of a wagon or single axle , may be to ...” The fourth paragraph shall be deleted. (single-axle mass is outside the scope of the recommendation)	Amended.
	3.7.2	This test is not applicable when the load receptor is inserted in the track without cutting of the rail	Amended.
	5.1.3.2	Read : “ The A complete instrument or modules shall be tested ...”	Amended.
	5.1.3.2.1	Title, read “ Single Uncoupled wagon weighing”	Amended.
	6.1.2	At the beginning, add the following paragraph : “The integral control instrument shall ensure the determination of the conventional true value of each reference wagon mass by full-draught weighing when stationary and uncoupled to an accuracy of at least one-third of the maximum permissible error for weighing in motion specified in 2.2.1”	Amended. Inserted 1st bulletin of 6.1.2.
	6.2.4	This test is not applicable when the load receptor is inserted in the track without cutting of the rail	Amended. Note inserted in paragraph.
	A.5.2.3	This test is not applicable when the load receptor is inserted in the track without cutting of the rail	Amended as above.
	A.7.2.5	The test should be made consistent with 13.1 of D 11	Amended.
	A.7.2.6	The test should be made consistent with 14.2 of D 11	Amended.
	A.7.3.1	The test should be made consistent with 13.4 of D 11	Amended.
	A.7.3.5.1	The test should be made consistent with 12.1.1 (level 3) of D 11	Amended.
	A.7.3.5.2	The test should be made consistent with 12.1.2 (level 3) of D 11	Amended.

Member	Clause	Comment	Secretariat comments
Germany	T.2.3.1	<p><i>Please add the underlined point:</i></p> <p>Single load receptor A load receptor that can support:</p> <ul style="list-style-type: none"> all the wheels of a wagon simultaneously for full-draught weighing, or <u>all the wheels of a bogie simultaneously for bogie partial weighing, or</u> all the wheels of an axle simultaneously for axle partial weighing. 	Amended.
	T.2.3.4	<p><i>Please add the underlined text for making it consistent with T.2.5.2 and avoid double definition:</i></p> <p>Load-measuring device</p> <p>Part of the instrument for measuring the load, and an indicating device <u>which displays the weighing result in units of mass.</u></p>	Amended.
	T.2.5	<p><i>Please add the underlined word to the note as follows:</i></p> <p>Note: Typical modules of an automatic weighing instrument are: load cell, indicator, analogue or <u>digital</u> data processing device, terminal, weighing module and remote display.</p>	Amended.
	T.3.5	<i>Why using "s" for speed instead the international sign "v" ?</i>	Amended.
	T.3.9	<i>Please change this point in accordance with R51, T.3.1.6 and 3.4.1 because T is the section for definitions and not for requirements. Besides in the present text the note (i.e. two adjacent values are allowed) is misleading because in a couple of tests for each printout a deviation of plus/minus 1 d from the final weighing value is allowed therefore in the couple of tests the maximum deviation between all printed values may be 2 d.</i>	Amended.
	T.4.2.9	<p><i>The text should read as follows because a MPE is a border not a range. (But this is a requirement and not correct for a definition)</i></p> <p>Maximum span stability error</p> <p>A span stability error greater than <u>greater than or</u> one-half of the absolute value of the maximum permissible error applicable to the load.</p>	Amended.

Member	Clause	Comment	Secretariat comments
Germany	2.1	<p><i>Please reinstall the accuracy class regime 0.2; 0.5; 1; and 2 for the WIM-instrument independent of wagon or train weighing because:</i></p> <p>a) <i>There is no reason to distinguish between wagon and train weighing.</i></p> <p>b) <i>It is unnecessarily much more complicated.</i></p> <p>c) <i>It supplies no information about the accuracy of the train weighing. Rather it is misleading because for example class A may be A/0.2 or A/0.5 or A/1. Therefore the marking "A" does not make sense.</i></p> <p>d) <i>It simulates a wrong analogy to R134 where the accuracy classes A; B; C; D; E and F are given for axle and axle group load because there is no conventional true value of standard weights for the direct comparison. But for the train mass you have the sum of the conventional true value of the reference wagons.</i></p>	Amended.
	3.2.5	<i>We do not see the application of this point. What is meant by "continuously verifying"?</i>	Amended.
	3.4.7	<p><i>Please alter "shall" to "may" because there is no reason to require a totalising device for an instrument for wagon weighing.</i></p> <p>Totalising device A WIM instrument shall <u>may</u> be provided with a totalising device which totalises the mass ...</p>	Amended.
	3.4.9	<i>Please delete the second sentence of the first paragraph because it is not applicable for rail-weighbridges.</i>	Amended.
	3.4.10	<p><i>Please change the point as follows because:</i></p> <p>a) <i>Indication and printouts not only of weights are required.</i></p> <p>b) <i>The scale interval d is also valid for the train mass if this is a verified weighing result (see c).</i></p> <p>c) <i>All indications or printouts of values which are not verified may be to a higher resolution.</i></p> <p>d) <i>It is not necessary to distinguish between partial axle and partial bogie weighing, the indication or printout of the partial mass is not necessary for verification.</i></p> <p>Indication or printout of weight for normal operation For normal operation the scale interval of indications or printouts of individual wagon mass <u>or total train mass</u> shall be the scale interval d.</p> <p>The scale interval of indications or printouts of measured or calculated values which are not verified the mean (systematic) error for a number of consecutive automatic weighings of a wagon or single axle, may be to a higher resolution than the scale interval d.</p> <p>The minimum printout resulting from each normal weighing operation shall be the date and the time, the operating speed, and in the case of wagon weighing each wagon mass and in the case of train weighing the train mass.</p> <p>For partial weighing of two-axle wagons, the minimum printout shall include the single-axle mass and number of axles (where applicable)</p>	Amended. Now 3.4.3.

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Germany	3.5.1	<p><i>Please change the last line as follows because it shall be more clear that the conditions of stable equilibrium are not applicable for WIM.</i></p> <p>For instruments that weigh dynamically the weighing in motion (wim) no separate criteria for stable equilibrium are given.</p>	Amended. Now 3.9.
	3.5.2	Please delete the last line because the conditions of stable equilibrium are not applicable for WIM.	Amended. Now 3.4.3
	3.6	<i>Please delete the last sentence because the conditions of stable equilibrium are not applicable for WIM.</i>	Amended. Now 3.4.2
	3.7	<p><i>Please change the whole section as follows because:</i></p> <p>a) <i>In section 3.7 all possibilities of integral control instruments shall be collected together, therefore 6.1.3 is moved to new 3.7.3 (Besides 6.1 is valid for full-draught-weighing and so 6.1.3 is not on the right place)</i></p> <p>b) <i>We introduce new 3.7.2 “ Integral control instrument for bogie partial weighing” with special conditions for 3.7.2.1, 3.7.2.3 and 3.7.2.5. We have good experiences with this kind of integral control instrument. The accuracy of the determination of the conventional true value of the reference wagons is much better than using a separate control instrument which is located in another region and which has been verified weeks or even month ago (See also our proposal for 6.6).</i></p> <p>For the use of this control instrument special conditions are necessary for eccentric loading and repeatability. The test under this conditions is a test of the quality of the instrument, the installation and the reference wagons.</p> <p>3.7 Integral control instrument</p> <p>3.7.1 Integral control instrument for full-draught wagon weighing</p> <p>If the WIM instrument under test is to be used as an integral control instrument, for the purposes of determining the wagon mass <u>by full-draught-weighing</u>, it shall meet the requirements of 3.7.1.1 to 3.7.1.4 inclusive, and 6.1.</p> <p>3.7.1.1 Zero-setting</p> <p>The instrument shall permit setting the indication to zero with a deviation of not more than ± 0.25 of the scale interval for a stationary load (2.4).</p> <p>3.7.1.2 Eccentric loading</p> <p>The indications for different positions of the load shall comply with the maximum permissible errors in 2.2.1 for the given load.</p>	Amended. Now 3.10 and 3.11

Member	Clause	Comment	Secretariat comments
Germany		<p>3.7.1.3 Discrimination An additional load that is equal to 1.4 times the scale interval for a stationary load, when gently placed on or withdrawn from each load receptor in turn when at equilibrium at any load shall change the initial indication.</p> <p>3.7.1.4 Repeatability The difference between the results of several weighings of the same load shall not be greater than the absolute value of the maximum permissible error of the instrument for that load.</p>	Amended.
	3.7.2	<p>Integral control instrument for bogie partial weighing</p> <p>If the WIM instrument under test is to be used as an integral control instrument, for the purposes of determining the wagon mass by two partial weighings per wagon (bogie-wise), it shall meet the requirements of 3.7.2.1 to 3.7.2.5 inclusive.</p> <p>3.7.2.1 Scale interval for stationary load</p> <p>The scale interval for stationary load (for test purposes) shall be equal or smaller than 1/10 d for the weighing in motion (wim) mode.</p> <p>3.7.2.2 Zero-setting</p> <p>The instrument shall permit setting the indication to zero with a deviation of not more than ± 0.25 of the scale interval for a stationary load (2.4).</p> <p>3.7.2.3 Eccentric loading The indications for different positions of the load (see test procedure) shall not be greater than 0,5 of the absolute value of the maximum permissible error (2.2.1) of the WIM-instrument for that load.</p> <p>3.7.2.4 Discrimination An additional load that is equal to 1.4 times the scale interval for a stationary load, when gently placed on or withdrawn from each load receptor in turn when at equilibrium at any load shall change the initial indication.</p> <p>3.7.2.5 Repeatability The difference between the results of several weighings of the same load shall not be greater than 0,5 of the absolute value of the maximum permissible error (2.2.1) of the WIM-instrument for that load.</p>	Amended.

Member	Clause	Comment	Secretariat comments
Germany	3.7.3	<p>Control instrument (separate or integral) for partial weighing of two-axle wagons</p> <p>An instrument constructed only for partial weighing of two-axle wagons may be used as the control instrument (separate or integral) for determining the conventional true value of the reference wagon mass by individual axle measurement when stationary provided that:</p> <ul style="list-style-type: none"> the alignment correction or exemption test for partial weighing instruments in Annex B has been successfully applied. it ensures the determination of the conventional true value of the static two-axle reference wagon mass to an error of at most one-third of the maximum permissible error for weighing-in-motion specified in 2.2.1. 	Amended.
	3.9		
	3.10		
	4.3.3		
	4.3.5		
	5.1.3.1		Amended.
	5.1.3.2	Should read 5.1.3.3	Amended.
	5.1.3.2.1	Should read 5.1.3.3.1	Amended.
	5.1.3.2.2	Should read 5.1.3.3.2	Amended.
	6.1	<p><i>Please change this section as follows because also partial weighing shall be allowed (see our proposal for new 3.7.2)</i></p> <p>Control instrument for full draught wagon weighing A control instrument for determining the conventional true value of each reference wagon mass by full draught weighing shall be available for testing. The control instrument may be either separate or integral.</p> <p>6.1.1 Separate control instrument A control instrument, separate from the instrument being tested shall ensure the determination of the conventional true value of each reference wagon mass by full draught weighing when stationary and uncoupled, to an accuracy of at least one-third of the maximum permissible error for weighing-in-motion specified in 2.2.1.</p>	Amended.

Member	Clause	Comment	Secretariat comments
Germany	6.1.3	Moved to new 3.7.3	Amended.
	6.2.1	<p><i>Please change this section as follows because:</i></p> <p>a) <i>Min and Max of the instrument are not important test points and the error does not change because percentage MPE is valid.</i></p> <p>b) <i>Important is the load on the load receptor in relation to the wagon weight. Therefore the test weight for testing near minimum wagon weight of i.e. 15 t will be 7500 kg for an instrument for bogie partial weighing (see our proposal of new 3.7.2).</i></p> <p>Test weights</p> <p>Errors shall be determined for <u>with</u> test weights of <u>which cause a load on the weigh bridge of:</u></p>	Amended.
		<ul style="list-style-type: none"> • zero; • <u>near minimum capacity wagon weight;</u> • <u>near maximum capacity wagon weight;</u> <p>a) at least two loads in between or near a load where the maximum permissible error changes.</p>	Amended.
	6.2.2	<p><i>Please add a second paragraph as follows because instruments for bogie partial weighing are fitted mostly with weighing sensors in sleepers or rails and do not have a conventional weigh bridge, therefore you have to test using a device that causes the same load transmission as a wagon and so you need a bogie:</i></p> <p>Distribution of test weights</p> <p>Except for eccentricity tests, standard weights shall be evenly distributed on the load receptor.</p> <p>For testing control instruments for bogie partial weighing a special test vehicle with known weight shall be used. It shall be a normal three-axle-bogie with a platform for the standard test weights.</p>	Amended.
	6.3.1	<p><i>Please add "for wim" as follows to make it clear that it is not the scale interval for stationary load that is meant:</i></p> <ul style="list-style-type: none"> • 35% of Max if the repeatability error is $\leq 0.3 d$ (for wim), • 20% of Max if the repeatability error is $\leq 0.2 d$ (for wim). 	Amended.

Member	Clause	Comment	Secretariat comments
Germany	6.4	<i>Please delete one of the double "that" in the first and the fifth line of the third paragraph.</i>	Amended.
	6.6	<p><i>Please change this section as follows because:</i></p> <p>a) <i>In accordance with A.9.2 and our proposal for new 3.7.2 the bogie partial weighing shall be possible.</i></p> <p>b) <i>The reference to A.9.3.1.2 is wrong.</i></p> <p>Conventional true value of the reference wagons mass</p> <p>The conventional true value of each reference wagon mass <u>normally</u> shall be determined by full draught weighing on a suitable control instrument, as detailed in A.9.3.1.2 <u>A.9.3.2.1</u>.</p> <p><u>If there is no suitable control instrument for full-draught weighing available with an acceptable accuracy or in an acceptable distance (see A.9.2) a control instrument for bogie partial weighing (separate or integral) may be used, as detailed in A.9.3.2.2.</u></p>	Amended.
	6.7	<p><i>Please change this section as follows because:</i></p> <p>a) <i>of our comments on 6.8.</i></p> <p>b) <i>A.3.6.2 is not applicable since you cannot use standard test weights to assess rounding error by wim.</i></p> <p><u>Indicated reference wagon mass during in-motion tests of coupled wagon weighing</u></p> <p>The indication or printout of the reference wagon mass <u>and the remaining wagon mass (6.4.2)</u> following an automatic weighing operation shall be observed and recorded. Where possible, the procedures of A.3.6.1 and A.3.6.2 shall be used to eliminate the rounding errors included in any digital indication and measurement of the weighing results.</p>	Amended.
	6.8	<p><i>We understand 6.7, 6.8 and A.9.3.3.3 in that way, that you will distinguish between two kinds of test wagons:</i></p> <p>(1) <i>reference wagons with a known conventional true value of mass in accordance with T.7.2 and</i></p> <p>(2) <i>remaining wagons if the number of reference wagons is less than the total number of wagons in a test train (see 6.4.2).</i></p> <p><i>For (1) the WIM-MPE shall be valid and for (2) the difference between the result of each individual run and the corrected mean value of all runs for that wagon shall be within the WIM-MPE.</i></p>	Amended. A.9.3.3.3 deleted.

Member	Clause	Comment	Secretariat comments
Germany		<p><i>This procedure is very complicated because you only can calculate a correction factor for the mean mass of individual remaining wagons and you can only do this if you have reference wagons with known conventional true value of mass of the same wagon type and nearly the same mass.</i></p> <p><i>Such a test and calculation is not usual up to now and we do not agree with initiating this test. Therefore we propose to delete A.9.3.3.3 and 6.8. The difficulty of this test procedure is being confirmed by the present A.9.3.3.3 which is wrong and not usable.</i></p> <p><i>Change this section as follows or delete it if you accept our proposal of deleting A.9.3.3.3:</i></p> <p>Mean values of the reference mass of the <u>remaining</u> wagon mass.</p> <p>The mean value for a reference the mass of a <u>remaining</u> wagon shall be the sum of the indicated or printed mass values obtained for a reference <u>remaining</u> wagon during the different runs of an in-motion test, divided by the number of values for that reference <u>remaining</u> wagon.</p>	Amended.
	A.7.1.2.1	<p><i>Please change this section as follows because we do not know what function a “train wheel simulator” shall have; influence and disturbance tests are done in nonautomatic operation with static load. The terminus “all electronic devices of the weighing system” is sufficient in our opinion:</i></p> <p>General</p> <p>The simulator for influence factor and disturbance tests should include all electronic devices of the weighing system. including a:</p> <ul style="list-style-type: none"> • weight simulator; • train wheel simulator. 	Amended.
	A.7.1.2.2	<i>Please delete the second paragraph (see our comments on A.7.1.2.1).</i>	Amended.
	A.7.2.6	<p><i>Please delete the complete A.7.2.6 for the following reason:</i></p> <p><i>It is hard to imagine how it should come to a rail weigh bridge operated by power from road vehicle networks. Keep in mind that the emphasis is not put on the battery but on the fact that it is a road vehicle battery being part of a road vehicle power net. The voltage of this net might vary by the amounts listed below. If only the battery is used as, so to speak, “stand-alone-power-source”, then the instrument has to be treated as a battery operated one.</i></p>	Amended. Road vehicle battery tests deleted.

Member	Clause	Comment	Secretariat comments
Germany	A.7.3	<p><i>REMARK: For all disturbance test a opening clause as already included in a footnote to the corresponding part of R51 (footnote to A.6.3.8.1) should be introduced. This would allow the EMC tests to be always performed according to the present “state-of-the-art”. Thus we should avoid a divergency between between R106 an future issues of IEC standards. Could the sentence under “Bibliography” fulfil this purpose?</i></p> <p><i>Moreover, please, delete the test “Electrical transient conduction for instruments powered by a road vehicle battery”.</i></p>	<p>Amended. As in R51. Please note that Footnote deleted from R51 at the request of TC9SC2 but inserted under BIBLIOGRAPHY.</p> <p>Amended. Road vehicle battery tests deleted.</p>
	A.7.3.4	<p><i>Please modify the last sentence of the first paragraph below the table as follows:</i></p> <p><i>“Tests with other (lower) voltages than those given in Table 14 are only not required when applying air discharges, starting with 2 kV and proceeding with 2 kV steps.” (coherent with IEC 61000-4-2)</i></p>	Amended. Last sentence deleted and note inserted in Table.
	A.7.3.5.1	<p><i>The table should no longer differentiate between “residential, commercial and light industry” and “industrial” environment:</i></p> <p><i>Reasons:</i></p> <p><i>a) The most recent draft of the new R76 does not differentiate either.</i></p> <p><i>b) It is hard to imagine that any other environment than “industrial” would apply to automatic rail weighbridges.</i></p>	Amended.
	A.7.3.5.2	<i>The comments on A.7.3.5.1 apply correspondingly.</i>	Amended.
	A.7.3.6	<i>Delete this paragraph, please. Reasons: Comments on A.7.2.6.</i>	Amended. A.7.2.6 deleted.
	A.9.2	<i>Please give a hint to section 6.6 at the end of the last sentence to show the alternatives.</i>	Amended.
	A.9.3.2	<p><i>Please change this section as follows because:</i></p> <p><i>a) Modification in accordance with our proposal of new 6.6.</i></p> <p><i>b) Completion that A.9.3.2.3 can be deleted.</i></p> <p><i>1. Four instead of five different wagon weighings (alternating from each direction after zero-setting before each wagon weighing) for the calculation of the conventional true value of the reference wagon mass will be sufficient in our opinion.</i></p>	Amended.

Member	Clause	Comment	Secretariat comments
Germany	A.9.3.2	<p>Wagon weighing</p> <p>A.9.3.2.1 Full-draught weighing of reference wagons</p> <p><i>The conventional true value of the reference mass (uncoupled, coupled or total train) shall be determined <u>normally</u> by full-draught weighing of the reference wagons with the appropriate load conditions on a suitable control instrument (see 6.6). A minimum of four different wagon weighing for each reference wagon shall be conducted using the following method:</i></p> <p><u>Weigh each static reference wagon in-turn (alternating from each direction after zero-setting before each wagon weighing) on the control instrument (6.1) and record the indications. Calculate the mean value of the four wagon masses for determining the conventional true value of the reference wagon mass</u></p> <p>A.9.3.2.2 Partial weighing of reference wagons</p> <p>A.9.3.2.2.1 Rail-alignment correction</p> <p>In accordance with the requirements in 6.1.3 3.7.3 for single-axle weighing instruments <u>for partial weighing of two-axle wagons</u>, the rail-alignment correction procedure in Annex B shall be applied to the totalised indicated mass of each reference wagon determined by partial weighing.</p> <p>A.9.3.2.2.2 Partial weighing using separate or integral control instrument</p> <p><i>The conventional true value of the reference wagon mass shall be determined for the reference wagon appropriately such that the axle <u>or bogie</u> weighing cover, as far as practicable, the weighing range of the instrument. With the wagon stationary and the wheels on the axle <u>or bogie</u> being weighed fully supported by the load receptor, a minimum of five <u>four</u> different axle weighing for each appropriately loaded single-axle <u>or bogie</u> shall be conducted using the following method.</i></p> <p><u>Weigh each axle <u>or bogie</u> of the static two-axle rigid reference vehicle in-turn (alternating from each direction after zero-setting before each wagon weighing) on the control instrument (6.1) and record the indications. After both axles <u>or bogies</u> have been weighed, calculate the mass of the two-axle wagon by the summation of the recorded values for the two axles <u>or bogies</u> and record the totalised value <u>calculate the mean value of the four wagon masses for determining the conventional true value of the reference wagon mass.</u></u></p>	Amended.

Member	Clause	Comment	Secretariat comments
Germany	A.9.3.2	<u>For instruments for partial weighing of two-axle wagons apply the alignment correction procedure determined in A.9.3.2.2.1 to the totalised value.</u>	Amended.
	A.9.3.2.3	Please delete this section because the new A.9.3.2.2.2 including our proposal gives now all necessary information and formulas for calculating a sum or mean value are not necessary. Everybody who is able to test a WIM-instrument will be able to calculate a sum or mean value.	Amended. A.9.3.2.3 deleted.
	A.9.3.3.1	<p>Please change as follows because</p> <p><i>a) the wagons have to use the rails (fourth paragraph) and</i> <i>b) all three conditions for each test run are not possible (fifth paragraph).</i></p> <p>General requirements Prior to any test adjust the instrument under test in-situ and in accordance with the manufacturer's specifications.</p> <p>All weighing operations shall be started with the reference wagon positioned in advance of the approach apron at a distance sufficient for the wagon to reach and maintain constant test speed before arriving at the apron and during each in-motion test.</p> <p>Test runs shall be conducted using the minimum number of reference wagons with the appropriate loading conditions for each wagon in accordance with 6.4.</p> <p>For each reference wagon the number of test runs shall be as specified in 6.5 carried out over the centre of the load receptor.</p> <p>All test runs shall be conducted at operating speeds that are within the range of speeds for which the instrument is be evaluated, with at least each <u>one</u> test run close to the:</p> <ul style="list-style-type: none"> (i) maximum operating speed (s_{\max}), (ii) minimum operating speed (s_{\min}) (iii) typical site operating speed. 	Amended.
	A.9.3.3.2	<p><i>Please change the numbers as follows in accordance with our proposal for A.9.3.2:</i></p> <p>Uncoupled wagon weighing (5.1.3.2.1) <u>(5.1.3.3.1)</u></p> <p>For each uncoupled reference wagon, record the mass of the wagon as indicated or printed by the instrument under test. Calculate the difference (error) in each recorded wagon mass and its respective static reference wagon mass determined in A.9.3.2.3 <u>A.9.3.2.2.2</u>.</p>	Amended.
	A.9.3.3.3	<i>Please delete this section in accordance with our comments on 6.8.</i>	Amended.

Member	Clause	Comment	Secretariat comments
Japan			
Netherlands	T	Several of the expressions defined in the Terminology, are not used in this draft. So please reconsider the necessity of such definitions. See also B.1.1 of the "OIML Directives for the Technical Work, Part 2". Also refer to the more detailed remarks below. And please note: there may be more than the ones we identified.	Amended.
	T.1.1	Definition of mass For our remarks, please also refer to previous remarks on other drafts from TC9/SC2. Although we do not see any need for this definition of mass, if the secretary insists to include a definition for "Mass", we prefer the formal (physical) definition. Or, as a 2 nd choice, you can use the definition in draft R 52-1.	Amended.
	T.1.3	Compared to other drafts from TC9/SC2, the expression " <i>weights</i> " can prevent confusion with the word "weight" which has 2 meanings: - The weight of an object - A standard of mass	Amended.
	T.1.6	Automatic weighing instrument => <u>no operator</u> But according to T.4.2.11 and 4.3.2, <u>there is an operator</u> . Conclusion: <u>these rail weigh bridges may be no automatic weighing instruments in the sense of T.1.6 !</u>	Amended. '...without the intervention of the operator...' removed from T.1.6.
	T.1.9	Please note that in this definition, the control instrument is " <i>.... used to determine the conventional true value of the mass of the reference wagons.</i> " (so <u>not the axle or bogie load</u>).	Amended. In accordance with Germany's comments. See 3.10.
	T.2	We suggest to add to the note a statement that a "device" can also be a particular function of the software .	Amended.
	T.2.1	Note: Contrary to R 134 (enforcement), for this completely different application (rail-weigh bridges) there is for us no problem with respect to the "controlled" weighing area and keeping the maximum speed by the driver.	Amended.
	T.2.3.5	The expression " <i>load conveyor</i> " is not used in this Recommendation. So this can be removed.	Deleted.
	T.2.3.6	The expression " <i>load transport system</i> " is not used in this Recommendation. So this can be removed.	Deleted.
	T.2.4.2	The expression " <i>electronic sub-assembly</i> " is not used in this Recommendation. So this can be removed.	Deleted.
	T.2.5.6 A.7.2.6	Please note that the word " <i>terminal</i> " has an other meaning in A.7.2.6	Deleted. Replaced with the terminology for 'user interface' in T.2.7.
	T.2.6.3	Please note that in the text both the expressions " <i>printing device</i> " and " <i>printer</i> " are used. Is there any difference?	Amended.

Member	Clause	Comment	Secretariat comments
Netherlands	T.2.5.8.2 Draft 28-11	In draft 28 November: <i>Type-specific</i> : Add to the end of the title (term to be defined), the word “ <i>parameter</i> ”.	Amended.
	T.3.10	The second line seems to be a different definition. But, as far as we can see, the expression “ <i>discrimination threshold</i> ” is not used in the rest of the draft so it can be removed. In case it is not removed, we propose to insert: T.3.11 Discrimination threshold <i>The discrimination threshold, for a given load, is the value of the smallest additional load that, when gently deposited on or removed from the load receptor, causes a perceptible change in the indication.</i>	Amended. Replaced with ‘level’.
	T.4.1	Please consider using the terms and definitions from the “VIM”, in particular 4.11 of the VIM	Amended.
	T.4.2.5 5.1.3.1.1	The definition is “ <i>Maximum permissible deviation</i> ”, but in 5.1.3.1, we read “ <i>maximum allowable deviation</i> ”. Any reason ?	MPD deleted.
	T.4.2.9	The expression “ <i>Maximum span stability error</i> ” is not used in this Recommendation, so this definition can be deleted. So what is the meaning of that 0,5 MPE ?	Deleted.
	T.4.2.11	* <i>the same operator</i> But according to T.1.6, there is no operator.	T.1.6 amended.
	T.7.1	As far as we know, a “ <i>goods vehicle</i> ” is used on a road; but when a train is concerned, we think it is called a “ <i>goods carriage</i> ” or a “ <i>(goods) wag(g)on</i> ”. So please reconsider this expression.	Amended. ‘goods’ deleted.
	1.1 + General	What is the advantage of denoting “automatic rail-weighbridges” as “WIM instruments” ? And mostly, these instruments can also be used for static weighing of wagons.	Amended. WIM removed where applicable.
	2.2.1	We suggest to clarify the table by adding a column to the left, indicating the accuracy class.	Amended.
	2.2.2	We suggest to add a clause like in R 76: 3.5.3.2 Elimination of rounding error <i>The rounding error included in any digital indication shall be eliminated if the actual scale interval is greater than 0.2 e.</i>	Amended. Inserted in last paragraph of 2.3.
	2.7.1.1	We suggest to replace in the 2 nd paragraph: “ <i>for special application, however,</i> ” by “ <i>Depending on local environmental conditions ...</i> ” And (in accordance with OIML D 11) add that: * the lower temperature limit shall be (-40 °C), -25 °C, -10 °C, or +5 °C * the higher temperature shall be 30 °C, 40 °C, 55 °C, (70 °C), or (85 °C) (Consider quoting the figures in brackets or not) For further clarification, see OIML D 11, clause 10.1	Amended.
	2.7.2 and many other sub-clauses	The expressions “ <i>(electrical) power supply</i> ” and “ <i>AC mains power supply</i> ” can cause a misunderstanding as they can be too easily be confused with a “ <i>power converter</i> ”. And indeed, within 2.7.2, the “ <i>power supply</i> ” (mains power) meant in the text above the note is not the same as the “ <i>plug-in power supply</i> ” (power converter) meant below the note ! So we highly recommend the definitions according to 3.21 - 3.24 in OIML D 11. And do you expect that for such “heavy industrial” equipment a “plug-in power converter” will ever be used ?	Amended. Replaced with ‘mains power’ in text.

Member	Clause	Comment	Secretariat comments
Netherlands	2.7.2 A.7.2.5 A.7.2.6	Is it likely that these instruments will ever be powered by a battery (either a road vehicle battery or another rechargeable battery, or a disposable battery) ? If not, these requirements and tests can be deleted. And please note that in A.7.2.5, there is a test for internal batteries, but there is no requirement in 2.7.2.	Amended. Road battery power deleted.
	2.7.2	In 2.7.2, there is a contradiction (what is : U_{min} ?): * For AC: " U_{min} = -15 %" * Note: The minimum operating voltage (U_{min}) is defined as the lowest possible operating voltage before the instrument is automatically switched off.	Amended.
	2.8 (+ 3.4.2)	The symbols for kilogram and tonne should be printed Roman (upright). See 5.2 in the BIPM-publication "The International System of Units".	Amended.
	2.10	Consider adding: "... wagon or train"	Replaced with 'railway vehicle' as defined in T.1.8.
	3.2.4	Consider replacing "used" by "intended".	Amended.
	3.2.5	2 nd paragraph: consider adding "overload situation" and "high speed".	Amended. "overload situation" and "high speed" inserted.
	3.3.4	1 st paragraph: "A descriptionin the type approval certificate" We have no objection against this fact, but this is not a requirement for the measuring instrument. So this does not belong in clause 3.	Amended. Changed to 'test report'
	3.4.1	In this sub-clause, there is some redundant information: 1 st paragraph: "... reliable, easy and unambiguous"; 2 nd bullet: "... size, shape and clarity for reading to be easy"; last paragraph: "... reliable, simple and unambiguous reading ...".	Amended.
	3.4.1 3.4.2	Redundancy: Both these sub clauses require the name or symbol.	Amended.
	3.4.2	We suggest to add: * either: "... (comma or dot, according to national legislation)" * or: "... (generally a comma, but a dot is allowed in English spoken countries)" Also refer to: * OIML Directives for the Technical Work, Part 2, clause 6.6.1; * ISO 31-0, clause 3.3.2: "The decimal sign is a comma.In documents in English language, a dot is often used instead of a comma."	Amended.
	3.4.4	Please avoid the expressions "axle or boogie mass" and "these weighing results". In the workshop, the axle or boogie can be removed and weighed to determine its mass., but we suppose that is not meant here. By the way, the warning required here, is interesting compared to draft R 134 !	Amended. "axle or boogie mass" is determined in static weighing test only.
	3.4.5	We agree with this requirement. But this means that requirements for measuring the speed may be necessary as well ! Also refer to our remark 3.4.10	Amended. See 3.4.5.3, A.6.3 and A.9.4.
	3.4.7	In our opinion, this totalizing device should not be mandatory. So change the text: "....instrument <u>may be provided</u>"	Amended.

Member	Clause	Comment	Secretariat comments
Netherlands	3.4.9	1 st paragraph, " <i>lateral guide system</i> ": Is this indeed relevant for rail traffic, guided by the rails ?	Amended. " <i>lateral guide system</i> " deleted from text.
	3.4.10	2nd paragraph: Shall/may the <u>systematic error</u> be displayed/printed?	Amended. Now 3.4.3.
	3.4.10	The operating speed shall be printed. This means that requirements for measuring the speed may be necessary as well ! Also refer to our remark 3.4.5	See 3.4.5.3, A.6.3 and A.9.4.
	3.4.10	What is " <i>single axle mass</i> "? To determine this, the axle has to be removed! This clause is somewhat in contradiction with the requirement 3.4.4 !	Single axle or bogie load may be determined by partial weighing. See 3.10 and A.9.3.1.2.
	3.8.1	Consider to replace in the 2 nd line " <i>weighing instrument</i> " by " <i>load receptor</i> ". As the (complete) weighing instrument includes the indicator, printer, etc.	Amended.
	3.8.1	The statement " <i>Where particular shall be recorded in the test report</i> " is right, but this is not a technical requirement for the instrument. This should be included in Part 2 (Test Report Format).	Amended. Now 3.12.
	3.8.2	Is a load cell a " <i>vehicle-type identification device</i> "?	Amended. 'load cell' deleted
	3.8.2	Should a printer indeed be mandatory?	Amended. 'shall' changed to 'may'.
	3.8.4	Consider adding " <i>If necessary, an automatic 'bilge pump' (other expression?) shall be built in the pit.</i> "	Amended..
	3.8.5	Consider to replace " <i>.... with temperatures of</i> " by " <i>... where temperatures below the minimum specified temperature can be expected, there shall be</i> ". But we do not support this clause 3.8.5 at all, as if in such a case a heating is installed, there is a tremendous risk of negative effects to be dealt with (my personal experience in at least 2 cases from different manufacturers: the negative effect of such a heating can by far exceed the intended positive effect!): * If a load cell is warmed up at one side more than the other sides (resulting in a temperature-gradient over the enclosure), this can cause large unexpected effects. So anyhow, careful precautions have to be taken to ensure a <u>uniform</u> heating. * In case only the individual load cell(s) is/are placed in a small heated enclosure, great care has to be taken that there is no cold introduced from the construction resting on the load cell into the sensing element, resulting in a temperature gradient between the sensing element and the temperature compensating elements of the load cell. This can be prevented by a carefully designed thermally isolating loading pad between the structure and the sensing element. So in case a heating proposed in 3.8.5 will be allowed in this Recommendation, more detailed requirements will be necessary to prevent these problems. (And, although clause 3 gives the requirements for the instrument, we want to stress that in this case a careful investigation of these aspects <u>shall</u> be included in the test program for the type test, and also be described in the test report and the type approval documents.)	Text amended.

Member	Clause	Comment	Secretariat comments
Netherlands	3.9	The “limitation” to a “WIM instrument” is not necessary. Therefore delete: * in the 1 st paragraph “used in WIM instruments”; * in the 2 nd and 3 rd paragraph: “WIM”.	Amended.
	3.9	Last sentence: Clause 3 contains the technical requirements (for the instrument). “and listed in the type approval certificate” is not a requirement for the instrument, so this should be moved to 5.1	Amended.
	3.10.1	The intention is right, but may be this goes too far: This means for instance that in case if a traditional mechanical construction, the knife-edges and the pans shall be sealed!	Amended.
	3.10.3	What is a “(semi)automatic span adjustment facility” ?	As specified in OIML R 76-1 2CD. A device to adjust instrument parameters, e.g. zero adjustment
	3.11.1	Not only the load receptors shall bear a serial number; also the indicator/complete instrument.	Amended. ‘Instruments and associated modules’ inserted.
	3.11.5	1 st bullet: What do you mean by “designation”? Is it “accuracy class”?	Amended. Deleted.
	4 4.1.1	Why only for electronic instruments ? (for instance temperature requirement) And: can anybody imagine a purely mechanical <u>automatic</u> rail weighbridge that <u>shall</u> (3.8.2) be provided with a printer and control unit?	Amended. Clause 4 is the format adopted in OIML Recommendations
	4.3.2	“... <i>observed by the operator</i> ...”, but from T.1.6, we understand there is no operator.	T.1.6 amended.
	4.3.3 And A.7.2.3	Who decides this choice between a) and b)? * the manufacturer (specifications) ? * the test lab (available facilities) ? * Or shall both tests be carried out and it is OK when one test is successful ? Or implies the note that in all other cases (a) is applicable? Another approach: The weighing zones of these rail-weigh bridges are usually placed outdoors; the indicator, printer, etc indoors. So, in our opinion, for the load receptor there is always a real possibility of condensation and cyclic temperature environments. And this is not the case for the indicator etc.	Damp, heat cyclic test deleted.

Member	Clause	Comment	Secretariat comments
Netherlands	4.3.6, 4.3.7 and many other sub-clauses	<p>As we reported also for other drafts from TC9/SC2, the expression (power) “supply” can cause a misunderstanding.</p> <p>Also refer to the definitions 3.21 - 3.24 in OIML D 11.</p> <ul style="list-style-type: none"> * for some people, this is a (public) AC or DC mains power network; * for others, this is a “<i>power converter</i>” (power supply device) : a sub-assembly converting the voltage from the mains power to a voltage suitable for other sub assemblies. <p>Also refer to the titles of A.7.2.4 and A.7.2.5; the terminology in OIML should be consistent.</p> <p>Furthermore, please note for 4.3.7 that “<i>DC mains power</i>” is completely different from internal (one way?) batteries and from 12 V or 24 V road vehicle battery power.</p> <ul style="list-style-type: none"> * DC power networks are unusual like public networks, but they are found in particular in the oil industry (refineries etc.). * However not explicitly mentioned in OIML D 11, a “<i>road vehicle battery</i>” is meant there to be the regular battery of a car (charged by the car’s generator and also used for the starter-engine and the other electrical “consumers” in the car). * A completely different situation is a rechargeable <u>auxiliary</u> battery. This is also explicitly covered by OIML D 11 (clause 5.5.2) and we can well imagine that this aspect can be very relevant for rail-weighbridges. <p>All these different situations are purposely separately covered by OIML D 11.</p> <p>Is it likely that rail-weighbridges will in practice be powered by an internal (non-rechargeable) battery or a car’s battery?</p> <p>In the present text, there are no requirements for instruments powered by a 12 V or 24 V road vehicle battery. So performing test A.7.2.6 would be “illegal”. No test without a requirement !</p>	‘Power supply’ replaced with mains or battery voltage, where applicable.
	4.4	<p>Clause 4 gives <u>requirements</u> for (electronic) instruments. So 4.4 should be moved to clause 5.</p> <p>And most of the text is also applicable for purely mechanical instruments.</p>	Amended.
	4.4.2	1 st paragraph, 2 nd line, replace “... <i>the Annex</i> ...” by “... <i>Annex A</i> ...”	Amended.
	5.1.1	Consider adding “ <i>Operating instructions</i> ”.	Amended. ‘Operating manual’ added.
	5.1.3, c)	<p>Last dot:, the word “<i>ensure</i>”.</p> <ul style="list-style-type: none"> - The <u>manufacturer</u> has to <u>ensure</u> this - The <u>authority</u> has to <u>check</u> that the manufacturer fulfils this requirement. 	Amended.
	5.1.3.1	Consider adding one more bullet (or combine with the 2 nd bullet): “ <i>when a module is intended to be used for various kinds of weighing instruments (in particular load cells, indicators, printers)</i> ”.	Amended. Bullet added.
	5.1.3.1.1 T.4.2.5	The definition is “ <i>Maximum permissible deviation</i> ”, but in 5.1.3.1, we read “ <i>maximum allowable deviation</i> ”. Any reason ?	“ <i>Maximum permissible deviation</i> ” deleted.
	5.1.5	Please note that many of the tests for type evaluation (in particular annex A) can <u>impossibly</u> be carried out on site, but can <u>only</u> be done in a laboratory.	Amended.

Member	Clause	Comment	Secretariat comments
Netherlands	6.3	Reconsider the required accuracy of the standard weights: one third is very "rough". One tenth should be easily achievable.	Specified in accordance with R76-1 2CD.
	6.4.2 + other clauses	What about the weight of the <u>locomotive</u> in case of train weighing? Keep also in mind for instance its varying diesel contents (if applicable).	Deals with wagon weighing only. See T.3.1.3.3 and T.3.1.6
	6.7	Delete the words: " <i>Where possible</i> ".	Amended.
	Annex A	Consider moving the " <i>meaning of symbols</i> " as a last item to the chapter "Terminology".	Amended.
	A.2.3	We suggest to add: "... according to <u>the requirements in 3.11 and the type approval documents.</u> "	Amended.
	A.3.1	As already mentioned above, the expression " <i>(electrical) power supply</i> " can cause a misunderstanding. Why not adopt the definitions 3.21 - 3.24 in OIML D 11 ?	Amended.
	A.3.2	A significant fault is not necessarily indicated, propose to change "... <i>except to reset if a significant fault has <u>been indicated.</u></i> " to: "... <i>except to reset if a significant fault has <u>occurred.</u></i> "	Amended.
	A.3.3	End 1 st paragraph: Why the last sentence " <i>Note that to in-motion test.</i> "? Consider adding a remark that during the tests on site, the weather shall not be too windy/stormy/rainy/snowy.	Amended.
	A.3.5	Why this requirement? After preloading, the repeatability of the instrument will be better, but in practical applications, the instrument is also not preloaded.	Amended. Requirement deleted.
	A.3.6.1	Would 0.7 d also be OK ? We suggest to modify the text: "... <i>with a scale interval of 0,2 d or less ...</i> ".	Amended.
	A.5.1.1.1 A.5.1.1.2	As under A.5.1.1.1 the instrument has been switched off several times, please note that between A.5.1.1.1 and A.5.1.1.2 it can be necessary to take at least some warm-up time into account.	In simulated tests, it not expected to have significant influence.
	A.5.1.1.1	(b)(5) In our opinion, it is <u>not</u> good practice for the test lab to perform any adjustments. But that may vary among test labs. Do you really mean " <i>calibration</i> " here? Please note the definition of " <i>calibration</i> " in the "VIM".	Amended. Deleted.
	A.5.1.1.1 A.5.1.1.3	Is, for this kind of instrument, a platform a " <i>non-essential component/part</i> "? Is it practical to remove it ? Is there a difference between <i>component</i> (A.5.1.1.1) and <i>part</i> (A.5.1.1.3)? Is, for this kind of instrument, removal of the load receptor (A.5.1.1.3) practical and advisable ?	Amended.
	A.5.1.3 (a)	2 nd line: replace " <i>instrument</i> " by " <i>zero setting</i> " (the span adjustment shall not be touched !)	Amended.
	A.5.2	The major part of this test is also relevant if the instrument is to be used as a non-automatic weighing instrument as well. (Except for A.5.2.2.2)	Amended.
	(A.5.2.3)	Due to the lay-out of the text, the "last" sentence: " <i>if the instrument is provided following tests.</i> " seems to belong to A.5.2.3, but it refers to A.5.2.4 up to ?????	Amended.

Member	Clause	Comment	Secretariat comments
	A.7.1.1	The “limitation” to a “WIM instrument” is not necessary. Therefore delete in the 1 st paragraph “WIM”.	Amended.
	A.7.1.1	As for instance the temperature-requirement is not limited to electronic instruments, we propose to delete the word “ <i>electronic</i> ” from the 2 nd paragraph of A.7.1.1.	Amended.
	A.7.1.1	5th paragraph, 2 nd word: consider replacing “ <i>parts</i> ” by “ <i>modules</i> ”	Amended.
	A.7.1.2.1	The word “ <i>simulator</i> ” has not been defined and might be confusing in the sense it has been used here. Reading the text “ <i>The simulator should include all electronic devices of the weighing system</i> ”, we guess that in this context the word “ <i>simulator</i> ” has an other meaning than usual (at least for us): * For us, a “ <i>simulator</i> ” is an external device (belonging to the equipment of the laboratory and not part of the EUT), facilitating testing by simulating a particular function or module of the EUT, in particular simulating the output signal of the load cell(s). * It seems that in this context, the “ <i>simulator</i> ” means the (combination of) module(s) under test.	Amended.
	A.7.2	We suggest to replace “ <i>Conditions applied</i> ” by “ <i>Criterion</i> ”.	Amended.
	A.7.2	According to OIML D 11, the test “ <i>damp heat, cyclic</i> ” is a disturbance and shall be evaluated to “ <i>No Significant fault After the disturbance</i> ”.	Amended. “ <i>damp heat, cyclic</i> ” test deleted.
	A.7.2.1 A.7.2.2	There is a problem with the prescribed test at 5 °C: According to 2.9.1.2, an instrument can be specified in, for instance, the range + 10 °C tot + 40 °C. In this case a test at 5 ° C is not applicable. So we suggest to change the text either: * <i>in such a way the test at 5 ° C is only applicable if 5 °C is within the specified temperature range,</i> or: * <i>In case 5 °C is outside the specified range, this temperature shall be replaced by a temperature about half way between the high and the low temperature limits.</i>	Amended.
	A.7.2.3	Please refer to our remark 4.3.3. The text: “ <i>.. shall be prescribed ...</i> ”: who shall prescribe this ? It is this OIML Recommendation that shall prescribe this !	Amended as above
	A.7.2.3	End of 2 nd line, typing error: replace (4.2.3) by (4.3.3).	Amended.

Member	Clause	Comment	Secretariat comments
Netherlands	A.7.2.5	<p>Please note that the situation for instruments powered by a “public” DC network is quite different from a battery powered instrument.</p> <p>For an internal battery (not to be charged while un use), there is no need to have a test/requirement for a U_{max}. This U_{max} has not been defined. In this case, it should be a fully new (or charged) battery, not subjected to other loads. In practice, this is equal to U_{nom}. The description of the test (“Test information”) indicates that too: “<i>Reduce the power voltage</i>”</p> <p>By the way: can we expect rail weighbridges powered this way?</p> <p>But we can imagine the application of a rechargeable <u>auxiliary</u> battery. This is also explicitly covered by OIML D 11 (clause 5.5.2). And also refer to our remarks to 4.3.6/4.3.7</p>	Amended.
	A.7.2.6 and A.7.3.6	<p>Can we expect rail weigh bridges powered by a road vehicle battery ? For the “definition” see our remarks to 4.3.6/4.3.7. If not, this test can be deleted.</p>	Amended. Road vehicle battery requirements deleted. Replaced with auxiliary battery power requirements.
	A.7.2.6	The word “ <i>terminals</i> ” in the note has another meaning than defined in T.2.5.6.	Amended.
	A.7.3	Add “ <i>sf</i> ” to the list of abbreviations.	Amended.
	A.7.3	We suggest to replace “ <i>Condition applied</i> ” by “ <i>Criterion</i> ”.	Amended.
	A.7.3	<p>Please note that “<i>electromagnetic susceptibility</i>” is a far more general concept than just “<i>electromagnetic fields</i>”.</p> <p>So replace “<i>electromagnetic susceptibility</i>” by “<i>electromagnetic fields</i>”.</p>	Amended.
	A.7.3	“ <i>Transient immunity test</i> ” can be somewhat confusing as A.7.3.6 relates only to road vehicle batteries.	Amended. Road vehicle battery test deleted.
	A.7.3	<p>There is a mistake in the last 2 references: “A.7.3.6” should be “A.7.3.6.1” and “A.7.3.7” should be “A.7.6.2”.</p>	Amended.
	A.7.3.1	We are missing (in case severity level 2 is meant) Test c. Please refer to OIML D11, 13.4.	Amended.
	A.7.3.2	The use of a coupling/decoupling network is also necessary for other ports. As this is already mentioned in the IEC standard, we propose to delete the line: “ <i>A coupling/decoupling network shall be applied for testing AC power ports.</i> ”	Amended.
	A.7.3.3	<p>Delete the note in table 13: rail weigh bridges are not integrating instruments. They may have a totalization device, but that is not a primary indication and using a static load already covers this.</p>	Amended.
	A.7.3.4	<p>Why the statement added that “<i>Tests with other (lower) voltages than those given in Table 18 are not required.</i>”?</p> <p>This inconsistent with OIML D 11, 12.2, note 1).</p>	Amended.
	A.7.3.5.1 A.7.3.5.2	<p>In our view, these rail weighbridges are a typical “heavy industrial” environment, so the 3 V/m for “residential, commercial and light industrial” environment makes no sense here. If the 3 V/m is indeed removed, the table in A.7.3.5.1 can be substantially simplified.</p>	Amended. 10V/m specified.

Member	Clause	Comment	Secretariat comments
Netherlands	A.7.3.6	However not explicitly mentioned in OIML D 11, a “road vehicle battery” is meant there to be the regular battery of a car (charged by the car’s generator and also used for the starter-engine and the other electrical “consumers” in the car). And in our opinion, it is not likely that rail weighbridges will ever be powered that way, so A.7.3.6 can be deleted.	Amended. Deleted.
	Annex B	There seems to be a contradiction between the title and B1: * Title: “mandatory” * B1: “.... is not recommended”	Amended.
	Bibliography	Replace (IEC) by (IEC, ISO, and OIML). Delete “or refer to the instrument”. Such a “dynamic” reference is understandable in standards, but in our opinion not acceptable in legislation.	Amended.
Poland			
Romania	T.2.6.3	The term „weight” should be replaced by „mass”; the same for clauses T.3.1.2, T.3.1.3.2, T.3.1.3.3, T.3.3, T.4.2.8, 2.7.2, 3.4.10 etc.	Amended.
	T.3.3.1	The term „in-motion weight” should be replaced by „wagon mass” used in clause T.3.3.2.	Amended.
	T.3.5.1, T.3.5.2	The symbols „s _{max} ” and „s _{min} ” should be replaced by „v _{max} ” and „v _{min} ”; the same for clauses 3.11.2.1 and A.9.3.3.1.	Amended.
	T.3.8.2	We think that this clause is rather unclear.	Amended.
	T.4.2.5	We think that in this recommendation it is not necessary to define and use the terms „maximum permissible deviation (MPD)” and „corrected mean”. We propose to delete this clause (see also our proposal for clause A.9.3.3.3)	Amended. Deleted.
	T.7.1	The term „railway goods vehicle” is unclear.	Amended. ‘goods’ deleted.
	2.1.2 and 2.1.3	We think that the four accuracy classes for the train should be 0.2 0.5 1 2. It is neither necessary nor indicated to replace these usual denominations with A B C D.	Amended. MPEs for train deleted.
	2.2.1 Table 2	We think that table 2 should contain a column with accuracy classes. The term „in-service” should become „in-service inspection”.	Amended.
	2.2.2 Table 3	The term „in-service verification” should be modified to read „in-service inspection” (according to the provisions of clause 5.4).	Amended.
	3.4.7	We propose to replace „shall be” with „may be”.	Amended.
	3.4.9	The lateral guidance system is used for railway vehicles, not for wagons. We suggest to delete this clause.	Amended.
	3.4.10 par 2 and 4	We think that it is incorrect to require the printout of axle mass under normal operation. Therefore the provisions of these paragraphs should be corrected.	Amended.
	3.11.2.1	We propose to replace the phrase „accuracy class total mass A, B, C or D” with „accuracy class for train mass 0.2, 0.5, 1 or 2”	Amended.
	5.1.3.2 Evaluation...	We suggest to number as 5.1.3.3 and further 5.1.3.3.1, 5.1.3.3.2. See also the references from clause. 5.2.3.	Amended.
	5.1.3.2.2 (5.1.3.3.2)	We think that this clause should also refer to the error for the mass of the individual wagons, not only to the error for the train mass.	Amended.

Member	Clause	Comment	Secretariat comments
Romania	6.4.2	<p>a) We suggest to replace the first sentence „A minimum of five (and normally not more than fifteen) reference wagons in a test train.” with the following text: „Normally all the wagons in a test train shall be weighed, thus becoming reference wagons.”</p> <p><u>Justification:</u> Very often, during the tests, consecutive wagons in a train have significant systematic errors, but with different signs, while the wagons in certain positions in the train have systematic errors higher than those in the other wagons. Where the number of reference wagons is smaller, alteration of the information regarding the errors of the instrument under testing may be noticed.</p> <p>b) We propose to replace the sentence „The proportion of reference wagons to the remaining wagons in a test train shall be in accordance with Table 4” with the following: „Where the test train may not contain only reference wagons, the number of reference wagons may be reduced taking into consideration the limits given in Table 4.”</p> <p>c) We propose to include the following sentence: „Each of the two test trains should contain approximately the maximum number of wagons n_{max}.”</p> <p>d) Where the accuracy class of the train is higher than that of the wagons, a supplementary test train containing the minimum number n_{min} of wagons should be used.</p>	Amended. Subject to TC9/SC2 approval.
	6.6	„A.9.3.1.2” should be replaced with „A.9.3.2”	Amended.
	6.8	We think that in this recommendation it is not necessary to use the mean values of the reference wagon mass. Therefore we propose to delete this clause.	Amended. Deleted.
	A.3.6.2	We propose to replace the phrase „standard test weights” with „additional weights”. We also suggest to re-phrase the clause as follows: „Where necessary, additional weights (having maximum errors of $\pm 5\%$ compared to their nominal value) may be used to assess the error prior to rounding”.	Amended.
	A.9.3.2.2	We suggest to include the following text: „Determination by partial weighing of the conventional true value of the reference wagons mass is not recommended. Whenever possible, the conventional true value of each reference wagon mass shall be determined by full draught weighing.	Amended. Worded differently in last paragraph of A.9.2. See also 6.5.
	A.9.3.2.3	<p>The determination of the conventional true value of the reference wagons mass is very important and in some cases it may be very difficult. The following situations may occur:</p> <p>a) The control instrument provides measurements having an accuracy higher than the accuracy required at 6.1.2. In this case, one determination for each reference wagons will be sufficient.</p> <p>b) The control instrument has significant fidelity errors. In this case it is necessary to perform more determinations and to calculate the mean for each reference wagon.</p> <p>c) The control instrument has significant systematic errors. In this case it is necessary to correct the indications of the control instrument in order to eliminate the systematic errors.</p> <p>We suggest to revise this clause to contain the above-mentioned situations.</p>	A.9.3.2.3 deleted in accordance with other proposals.

Member	Clause	Comment	Secretariat comments																								
Romania	A.9.3.3.1	In the first paragraph from page 83, we suggest to delete the text „the minimum number of”. In the second paragraph from page 83, we propose to delete the text „carried out over the centre of the load receptor.”	Amended.																								
	A.9.3.3.3	We suggest to revise this clause. We suggest to eliminate the terms „maximum permissible deviation (MPD)” and „corrected mean” since their use is not justified in the international recommendation R106. We think that the errors should be calculated in terms of the convetional true value of the reference wagons mass (determined by full static weighing of each uncoupled wagon).	Amended. maximum permissible deviation (MPD)” deleted.																								
	R106-2	We think that the revision of the R 106-2 test report may be continued only after the modifications to the first part of the recommendation have been operated.	Joint revision is necessary due to resources constraint.																								
		We think that only 4 accuracy classes should be defined and these should be 0.2 0.5 1 2 The symbols „S _{max} ” and „S _{min} ” should be replaced with „v _{max} ” and „v _{min} ”.	Amended.																								
	6.3.1, 6.4.2, 6.4.3	The tables from these pages need modifications in line with the modifications in R 106-1.	Amended.																								
Slovenia	2.2.1	<div>In Table 2 the accuracy classes for wagon mass and the accuracy classes for train mass are missing. We propose the following form of Table 2</div> <table><tr><th colspan="2">Accuracy class</th><th colspan="2">Percentage of mass of wagon or train, as appropriate</th></tr><tr><th>Wagon</th><th>Train</th><th>Initial verification</th><th>In-service</th></tr><tr><td>0.2</td><td>A</td><td>±0.10 %</td><td>±0.20%</td></tr><tr><td>0.5</td><td>B</td><td>±0.25 %</td><td>±0.50%</td></tr><tr><td>1</td><td>C</td><td>±0.50 %</td><td>±1.00%</td></tr><tr><td>2</td><td>D</td><td>±1.00 %</td><td>±2.00 %</td></tr></table>	Accuracy class		Percentage of mass of wagon or train, as appropriate		Wagon	Train	Initial verification	In-service	0.2	A	±0.10 %	±0.20%	0.5	B	±0.25 %	±0.50%	1	C	±0.50 %	±1.00%	2	D	±1.00 %	±2.00 %	Amended. MPEs for train deleted in accordance with other comments.
	Accuracy class		Percentage of mass of wagon or train, as appropriate																								
	Wagon	Train	Initial verification	In-service																							
	0.2	A	±0.10 %	±0.20%																							
0.5	B	±0.25 %	±0.50%																								
1	C	±0.50 %	±1.00%																								
2	D	±1.00 %	±2.00 %																								
	2.2.1.1	The maximum permissible error for wagon weighing according 2.2.1.1 c) can be 1 d. Is MPE of 1 d defined both for initial verification and in-service inspection? The other possibility is to define 1 d for initial verification and 2 d for in-service inspection.	Amended as above.																								
	2.2.1.2	The same comment as for 2.2.1.1.	Amended as above.																								

Member	Clause	Comment	Secretariat comments
Slovenia	2.7.2	<p>There are some inconsistencies in 2.7.2. We propose the following modified text for the first two paragraphs:</p> <p>An instrument shall comply with the appropriate metrological and technical requirements, if the voltage of the power supply varies from the nominal voltage, U_{nom}, or from the upper and lower limits of the voltage range (U_{min}, U_{max}) marked on the instrument at:</p> <ul style="list-style-type: none"> – AC mains power supply: lower limit = $0.85 \cdot U_{nom}$ or $0.85 \cdot U_{min}$, upper limit = $1.10 \cdot U_{nom}$ or $1.10 \cdot U_{max}$; – external or plug-in power supply (AC or DC), including rechargeable battery power supply: lower limit = minimum operating voltage, upper limit = $1.10 \cdot U_{nom}$ or $1.10 \cdot U_{max}$; – 12 V or 24 V road vehicle battery power: lower limit = 9 V (12 V battery) or 16 V (24 V battery), upper limit = 16 V (12 V battery) or 32 V (24 V battery). 	Amended in accordance with OIML D11 and Netherlands comments.
	3.9	3 rd paragraph deals with embedded software. Are there any requirements foreseen for work-station based software?	Amended. Now 3.13.
	3.11.1	Mass units should not be written in italic.	Amended.
	3.11.2.1	Mass units should not be written in italic.	Amended.
	6.4.2	In 3 rd line of Table 4 write $n \leq 10$ instead of $< n \leq 10$	Amended.
	A.7.2.4	Harmonize definitions of test specifications in Table 7 with the specifications in 2.7.2 (see our comments to 2.7.2).	Amended.
	A.7.2.5	Harmonize the title, the first paragraph and Table 8 with the specifications in 2.7.2 (see our comments to 2.7.2).	Amended.
	A.7.2.6	In Table 10 replace U_{min} and U_{max} with Upper limit and Lower limit, respectively (see our comments to 2.7.2).	Amended.
	A.7.2.6	Table 10 should be named as Table 9 (the same is valid for all following tables)	Amended.
	3.5	Harmonize with clause 2.7.2 of R106-1: Replace $U_{max} + 10\%$ with $1.10 \cdot U_{nom}$ or $1.10 \cdot U_{max}$. Replace $U_{min} - 15\%$ with $0.85 \cdot U_{nom}$ or $0.85 \cdot U_{min}$.	Amended.
	3.5	Harmonize with clause 2.7.2 of R106-1: title, voltage conditions	Amended.
	3.6	with clause 2.7.2 of R106-1: Replace U_{max} with Upper limit and U_{min} with Lower limit.	Amended.

Member	Clause	Comment	Secretariat comments
Spain			
Switzerland	T.1.3	Update reference [1] to OIML R 111-1 (2004)	Amended.
	A.5.2.4	Discrimination: Missing text in explanation: ... is decreased unambiguously by one actual scale interval, I – d. One of the weights shall be replaced and a load equal to 1.4 d placed on the load receptor ...	Amended.
	A.9.3.2.3. (2) 1)	Reference A.9.3.1.3 does not exist	Amended.
	A.9.3.2.3. (2) 2)	formula should be $\overline{Ax/e_i} = \frac{\sum_1^5 Ax/e_i}{5}$ Sum is 1 to 5 (not 3)	A.93.2.3 deleted in accordance with other comments.
	formulas	The formulas are not written in a scientific way, preferable to write the following way $\overline{m_{Ax/e_i}} = \frac{\sum_{n=1}^5 m_{Ax/e_{i_n}}}{5}$	Amended.
	A.9.3.2.2.2 2 nd sentence A.9.3.2.3, 3 rd line A.9.3.2.3 (1) title etc	Everywhere where is question of the mass, should be "value of the mass"	Amended.
	A.9.3.2.3 (2) 1) ... 4)	The document structure is in some cases like in this clause too complicated. A simplification would improve the clarity.	Amended as above.
	Bibliography	Update reference [1] to OIML R 111-1 (2004)	Amended.
	R106-2 Accuracy class	In R 106-1 ch. 2.1.1 only accuracy classes 0.2, 0.5, 1, 2 and A, B, C, D are given. Remove accuracy classes 5, 10, E and F in R 106-2 or add in R 106-1.	Amended. MPEs for train deleted.
	Power supply	Superscript ² for the footnote in the term U _{nom} may conduct to errors, suggestion to use symbols instead of numbers	Numbers provide better clarification as there are many footnotes.
	scale interval d	Formatting: leave more vertical space for writing value	Amended.
	scale interval d	Formatting: align dotted lines to the ones above	Amended.
	6.3.2.1 Accuracy class	Formatting: leave more vertical space for writing value	Amended.

Member	Clause	Comment	Secretariat comments
Sweden			
UK	General	<p>The proposed changes to R 106 contained in the draft document circulated for I comment do not take into account:</p> <ul style="list-style-type: none"> • New technologies • Trends towards the measurement of parameters other than vehicle and train mass <p>In addition to these omissions practical guidance should be given, or a section should be devoted to the testing of systems that operate at speeds ranging from virtually zero up to line speed which could be 100 km/h.</p> <p>New Technologies The structure and tenor of the document is heavily biased towards conventional weighbridges i.e. weighbridges having:</p> <ul style="list-style-type: none"> • A Load receptor • Load sensors • A Weight indicator <p>Because of the high initial cost and limited speed of operation the proportion of conventional weighbridges being installed has been steadily dropping over the past decade and is now at a very low level. The trend is towards the 'in track' and 'active sleeper' types.</p> <p>Calibration Calibration is only described in terms of test weights. These can not be employed to test an 'in track' weighbridge and cognisance should be given to the use of 'reference cells' ;</p> <p>Fibre Optic Technologies There are dynamic weighridges in operation, for check weighing, that use fibre optics as the load sensing elements and it is only a matter of time before they will be used routinely for trading purposes. The document should take account of this development.</p> <p>Laser Technologies There are weighbridges in use that employ lasers. These measure deflection in a member that is transposed into a force.</p>	<p>Amended to line up with technology developments.</p> <p>New definition 'Load sensor' in T.2.5.1 encompassing sensor based on 'load cells', 'fibre optics', and 'laser'.</p>

Member	Clause	Comment	Secretariat comments
UK		Measurement of Quantities other than Vehicle Mass No references are made in the document to the measurement of wheel and axle load and the evaluation of parameters such overload and eccentric loading (side to side and end to end imbalance'. These are serious omissions. Infrastructure operators are becoming increasingly aware and concerned about these parameters and in some countries are levying an additional access charge when the maximum permitted limit has been exceeded. Overloads can cause infrastructure damage such gauge end cracking that leads to rail breakages which can have serious safety repercussions. Eccentric loading can also be a safety hazard. It is important that RI 06 addresses the measurement of axle and wheel loads because they will be used for trading purposes in the future.	Axle and bogie load included.
	T .1.2 Load	Is the definition correct in the context of a rail weighbridge? ' <i>The force impinging on the toad receptor</i> ', or something similar would be more appropriate	Amended. Worded differently.
	T.1.4 Weighing	The last eight words. <i>...from the effect of gravity on the object'</i> should be removed. It is not the place of a standard to state how an end is to be achieved	Amended.
	T .1.5	Weighing Instrument The last six words. <i>...by using the action of gravity'</i> should be removed It is not the place of a standard to state how an end is to be achieved	Terminology defines the instrument and its main process.
	T .1.7	Rail-weighbridge Change the definition to: <i>'A weighing instrument having a toad receptor or toad receptors</i>	Amended.
	T .1.9	Control Instrument What does 'conventional' mean? A value is either true or not true. Change to: 'Weighing instrument used to determine the mass of the reference wagons when stationary and un-coupled'	Amended. Now T.1.15. The prefix <i>true</i> is sometimes added to the word <i>mass</i> where it is important to make it clear that a particular value of mass being considered is not a <i>conventional mass</i> value and it is particularly important to avoid this potential ambiguity when, for example, specifying the value of weights
	T .1.10 Conventional true value	Same comments as above apply Insert the word 'sometimes' to accord with the 'International Vocabulary of Basic & General Terms in Metrology' 'A value attributed to a particular quantity and accepted sometimes by convention as having an uncertainty appropriate for a given purpose'.	Amended as above
	T .1.12	Accuracy of a measuring instrument Is the Note correct? Surely the whole purpose of testing is to determine the errors and quantify the accuracy!	Amended. Deleted.
	T .2.2	Weigh Zone. Does the weigh zone not include the aprons? A wider definition is required	Amended.

Member	Clause	Comment	Secretariat comments
UK	T.2.2.1	Apron Add at the end' <i>and forms part of the weigh zone,</i>	Amended.
	T .2.3.1	Single load receptor Add another bullet point • <i>A single wheel of an axle</i>	Amended.
	T .2.3.2	Multiple load receptors Reduce the definition to: ' <i>Two or more load receptor</i> ' This makes the definition independent of technology	Amended. Integrated into T.2.3.1.
	T .2.3.5	Load Conveyor & T .2.3.6 Load Transport System. Are these definitions necessary, correct and relevant?	Deleted.
	T .2.4.1	Electronic device. Change the words' <i>a specific function</i> ' to' <i>one or more functions</i>	Amended.
	T .2.4.2	Electronic sub-assembly. Are the words' <i>comprised of</i> ' correct English?	Deleted.
	T .2.5	Module. Is a printer a module in this context? If it is the last sentence is not correct because a printer is not subjected to partial error limits!	Amended.
	T .2.5. 1	Load cell. Load cell has a very specific meaning in metrology terms and, to avoid confusion, it should not be broadened to include other devices. An additional definition is therefore required that caters for the load sensing devices employed in newer types of weighbridges. It could be <i>LOAD SENSOR</i> and it should not be defined in terms of a particular technology. It should encompass all types of load sensing device including conventional load cells.	Now T.2.5.1. Amended.
	T .2.5.2	Indicator. In the definition change the words load cell to ' <i>load sensor</i> '	Amended.
	T .3.1.2	Partial weighing. Replace the words 'the same' with 'a ' Change receptor to ' <i>receptor(s)</i> '	Amended.
	T .3.1.3.3	Train weighing. Can the word 'coupled' be removed? On a hump scale wagons usually go over it uncoupled.	Amended.
	T .3.2.1	Maximum capacity The purpose of this parameter needs explanation.	See T.3.2.1.

Member	Clause	Comment	Secretariat comments
UK	T .3.5.1	Max Operating Speed Smax Is the symbol for speed v ?	Amended.
	T .3.5.4	Maximum Transit Speed Why include this? On modern weighbridges there is no maximum transit speed.	Amended. 'Where appropriate' inserted to allow for all types of weighbridges.
	T .3.8	Final weighing value This definition needs explanation	Amended. This is the last value as recorded by the control instrument during static weighing test.
	T.4.2.3	Initial Intrinsic Error How is this determined and why?	The Initial Intrinsic Error is determined during the static weighing test in A.5.2.2.2. See
	T .6.1	Static Tests. Change the word ' <i>weights</i> ' to 'calibrated load' Modern weighbridges can be calibrated without weights	Amended.
	T.7.1	Wagon. Remove the word ' <i>goods</i> '. Why limit the scope of the system to weighing only goods carrying vehicles	Amended.
	T .7.3	Coupled wagon. The definition needs re-drafting.	Amended.
	T .7.4	Total train. Why restrict to coupled wagons. In a 'hump' yard wagons are generally uncoupled.	Amended.
	2.1.3	Relationship between accuracy classes. This relationship is unnecessary. It is possible to achieve class 0.2 on total train and only class 2 for wagons	Amended. Accuracy class for total train deleted.
	2.7.2	Power Supply. Is U the standard symbol for voltage or is it V ?	Amended.
	2.8	Units of Mass. What about lb? This standard is international	The unit of mass, the kilogram (kg), remains the only base unit in the International System of Units (SI).
	3.2.5	Automatic Operation. The phrase ' <i>near to certainty</i> ' is not precise This section needs re-drafting.	Amended. 'near to certainty' replaced with 'ensure'.
	3.3.2	Maximum Effect. There is no need to have these restrictions that are historical rather than rational	Requirements are as in OIML R76 2CD (2006).
	3.4.4	Single axle or bogie mass. These are quantities that rail operators will want to trade on in the future. Axle/bogie, overloading causes infra structure damage	Amended.
	3.4.5	Operating Speed. Printing of Weights obtained in over speed should be permitted along with an over speed indicator. This is operationally useful	Amended.
	3.4.10	Indication or printout of weight for normal operation This section should be reviewed.	Amended.

Member	Clause	Comment	Secretariat comments
USA	R106-1, T.2.3.1	<p>The U.S suggests modifying the document to account for the various wagon types found in many countries. The second bullet should not be limited to single axle weighing as many multi-draught weighing systems are used to weigh wagons equipped with four axles (i.e., each pair of axles positioned beneath opposite ends of a wagon are weighed simultaneously and the results summed). Additionally, the U.S. suggests replacing the phrase “partial weighing” as indicated in T.2.3.1 and all additional references of the term throughout the document with the term “multi-draught weighing”. Partial implies the entire wagon was <u>not</u> weighed.</p> <p>The U.S offers the following modifications for consideration:</p> <ul style="list-style-type: none"> • Modify T.2.3.1 as shown below: <p>T.2.3.1 Single load receptor A load receptor that can support:</p> <ul style="list-style-type: none"> - all the wheels of a wagon simultaneously for full-draught weighing, or - all the wheels of an axle or bogie simultaneously for multi-draught weighing. <ul style="list-style-type: none"> • Add a new definition to the terminology section for the term “bogie”: <p>Bogie: a set of two or more axles positioned beneath each end of a wagon.</p>	Amended. ‘Bogie’ inserted in terminology and other parts of R106.
	R106-1, T.3.1.2	Change the reference to “printed values” to “recorded values.” This comment is global for <u>all</u> references within R106-1. This change allows for newer technologies that permit values to be stored without using conventional printing.	Amended.
	R106-1, T.3.8	The definition of “Final weighing value” for a WIM system cannot require the instrument to be “completely at rest” based on the nature of the moving wagons. WIM systems determine the weight of a wagon while the vehicle is moving and <u>not</u> at rest.	Amended. Applies to static weighing test only. Now T.3.9.
	R106-1, T.7.2	Replace the phrase “those to be used for weighing” to “those normally weighed.” In normal operation, wagons are not “used for weighing.”	Amended. Now T.1.10.
	R106-1, T.7.3	Clarify that coupled wagons can be weighed for either individual or unit train weighing. Re-title “Coupled Wagons” and change definition as follows: Coupled Wagons A number of wagons coupled whose individual or collective mass is to be determined.	Amended. Now T.1.12.
	R106-1, 2.1.2, 2.1.3	The rationale for having four accuracy classes for train mass is not apparent. The use of the four classes (A, B, C and D) is not clear.	Amended. MPEs for train deleted in accordance with other comments.

Member	Clause	Comment	Secretariat comments
USA	R106-1, 2.2	<p>The performance criteria listed in document clause 2.2 and the examples provided in Figure 1 are unclear. The U.S. suggests that the information be reorganized and sufficient detail added to improve clarification. A few suggestions are included below:</p> <ul style="list-style-type: none"> • Figure 1 displays two separate graphs to illustrate examples of the application of 2.2.1.1 wagon weighing, (upper graph) and 2.2.1.2 train weighing (lower graph). Both graphs provide an illustration of the MPE for an <u>initial verification</u>. Sufficient explanation is not present to indicate that these graphs apply only to initial verifications. Although the sentence at the top of page 19 does appear to correctly describe the application of the upper graph (example of wagon weighing), the sentence is in the wrong document clause (i.e., 2.2.1.2, the document clause applicable to train weighing). The U.S. believes that the sentence at the top of page 19 should be modified and included as a part of document clause 2.2.1.1. (suggested change shown underlined below) • Figure 1, on page 19, provides an illustration of the application of the MPE on an initial verification for both Wagon Weighing (as defined in 2.2.1.1) and Train Weighing (as defined in 2.2.1.2), yet only 2.2.1.2 references Figure 1. (Consider adding final sentences to 2.2.1.1. and 2.2.1.2.as shown underlined below) • Table 2 does not include a reference to any of the eight accuracy classes listed in 2.1.1 and 2.1.2. Additionally, nowhere in the working draft document has the U.S. been able to find a listing of the maximum permissible errors for any of the proposed new accuracy classes listed in 2.1.2 for total train mass. As previously indicated, the rationale for having different accuracy classes for train versus wagon weighing is not apparent. However, if the new accuracy classes proposed under 2.1.1 and 2.1.2 are ultimately added to R106-1, the U.S. believes that Table 2 should include a reference to each of these accuracy classes. A modified version of Table 2 is included below for example. • Some additional suggested changes to the organization and terminology provided in 2.2.1, 2.2.1.1, and 2.2.1.2 are underlined below. • Two additional suggestions for improving the clarification of Figure 1 on page 19 are as follows: (examples illustrating these suggestions <u>not</u> provided) <ol style="list-style-type: none"> 1 Add additional terminology to clarify that the illustration applies only to <u>initial verification tests</u> involving the weighing of <u>coupled wagons</u>. 2 Increase the font size and/or make bold the terms “Wagon weighing” and “Train weighing” 	Amended.

Member	Clause	Comment	Secretariat comments
USA	R10601, 2.2 continued	<p>2.2 Maximum permissible errors</p> <p>2.2.1 Weighing-in-motion</p> <p>The maximum permissible errors for weighing-in-motion shall be as specified in 2.2.1.1 for wagon weighing and 2.2.1.2 for train weighing.</p> <p>2.2.1.1 Wagon weighing</p> <p>b) The maximum permissible error for wagon weighing, shall not exceed one of the following values, whichever is greater: the value calculated using the appropriate accuracy class listed in Table 2, rounded to the nearest scale interval;</p> <p>c) the value calculated using the appropriate accuracy class listed in Table 2, rounded to the nearest scale interval for the mass of a single wagon equal to 35 % of the maximum wagon mass (as inscribed on the descriptive markings), or</p> <p>d) 1 d.</p> <p>Note: On initial verification of an instrument weighing coupled wagons, the errors of not more than 10 % of the weighing results taken from one or more passes of the test train may exceed the appropriate maximum permissible error given in Table 2 and no result shall exceed two times that value.</p> <p>The upper graph of Figure 1, titled “Wagon Weighing,” illustrates this requirement.</p> <p>2.2.1.2 Train weighing</p> <p>The maximum permissible error for train weighing shall be one of the following values, whichever is greater:</p> <p>a) the value calculated using the appropriate accuracy class listed in Table 2, rounded to the nearest scale interval;</p> <p>b) the value calculated using the appropriate accuracy class listed in Table 2, for the mass of a single wagon equal to 35 % of the maximum wagon mass (as inscribed on the descriptive markings) multiplied by the number of reference wagons in the train (not exceeding 10 wagons) and rounded to the nearest scale interval, or</p> <p>c) 1 d for each wagon in the train but not exceeding 10 d.</p>	Amended. MPEs for train deleted in accordance with other comments.

Member	Clause	Comment	Secretariat comments																												
USA	R106-1, 2.2 continued Figure 1	<table><tr><th colspan="4">Table 2</th></tr><tr><th colspan="2">Percentage of mass of wagon or train, as appropriate</th><th>Accuracy class Wagon mass</th><th>Accuracy class Train mass</th></tr><tr><th>Initial verification</th><th>In-service</th><td></td><td></td></tr><tr><td>±0.10 %</td><td>±0.20%</td><td>0.2</td><td>A</td></tr><tr><td>±0.25 %</td><td>±0.50%</td><td>0.5</td><td>B</td></tr><tr><td>±0.50 %</td><td>±1.00%</td><td>1</td><td>C</td></tr><tr><td>±1.00 %</td><td>±2.00 %</td><td>2</td><td>D</td></tr></table>	Table 2				Percentage of mass of wagon or train, as appropriate		Accuracy class Wagon mass	Accuracy class Train mass	Initial verification	In-service			±0.10 %	±0.20%	0.2	A	±0.25 %	±0.50%	0.5	B	±0.50 %	±1.00%	1	C	±1.00 %	±2.00 %	2	D	MPEs for train mass deleted in accordance with other proposals.
	Table 2																														
	Percentage of mass of wagon or train, as appropriate		Accuracy class Wagon mass	Accuracy class Train mass																											
Initial verification	In-service																														
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±0.25 %	±0.50%	0.5	B																												
±0.50 %	±1.00%	1	C																												
±1.00 %	±2.00 %	2	D																												
	R106-1, 2.2.2 (Table 3) and 2.3(Table 4)	<p>The U.S. suggests adding the word “mass” to the ends of the first column titles of Table 3 and Table 4 to make these column titles consistent with the column title used in Table 1 as follows:</p> <p>Accuracy class Wagon mass</p>	Amended. MPEs are for wagon only as MPEs for train mass deleted from the document in accordance with proposals.																												
	R106-1, 2.2	<p>Consideration should be given to having the MPE for individual wagon weighing systems specified in divisions and not as a percentage. This would have the effect of harmonizing the means by which maximum permissible error is determined for automatic rail weighbridges with other scale types and has been used successfully in the U.S. For example, the table below indicates the tolerances that have been adopted for most railroad scale applications in the U.S. Note that all values specified in the table are in divisions. Additional U.S. performance requirements applicable to specific railroad applications are included beneath the table.</p> <p>Example of U.S. Tolerances (MPE) Railroad Scales (All values in this table are in scale divisions)</p> <table><tr><th colspan="3">Tolerances in scale divisions</th></tr><tr><th>1</th><th>2</th><th></th></tr><tr><th colspan="3">Test Load</th></tr><tr><td>0 - 500</td><td>501 - 1 000</td><td>(Add 1d for each additional 500 d or fraction thereof)</td></tr></table> <p>Coupled-In-Motion Railroad Weighing Systems. - The maintenance and acceptance tolerance values for the group of weight values appropriate to the application must satisfy the following conditions:</p> <ul style="list-style-type: none">For any group of weight values, the difference in the sum of the individual in-motion car weights of the group as compared to the sum of the individual static weights shall not exceed 0.2 %.	Tolerances in scale divisions			1	2		Test Load			0 - 500	501 - 1 000	(Add 1d for each additional 500 d or fraction thereof)	The current error regime of MPEs expressed in percentages has been used for a substantial period and allows for simpler application with greater clarity, flexibility and alignment with instrument directives. Substantial changes to the document will be required if the format of the MPEs is changed.																
Tolerances in scale divisions																															
1	2																														
Test Load																															
0 - 500	501 - 1 000	(Add 1d for each additional 500 d or fraction thereof)																													

Member	Clause	Comment	Secretariat comments
USA	R106-1, 2.2 continued	<ul style="list-style-type: none"> • If a weighing system is used to weigh trains of 5 or more cars, and if the individual car weights are used, any single weight value within the group must meet the following criteria: <ul style="list-style-type: none"> a) no single error may exceed 3 times the static maintenance tolerance; b) not more than 5 % of the errors may exceed 2 times the static maintenance tolerance; and c) not more than 35 % of the errors may exceed the static maintenance tolerance. • For any group of weight values wherein the sole purpose is to determine the sum of the group, the difference in the sum of the individual in-motion car weights of the group as compared to the sum of the individual static weights shall not exceed 0.2 %. • For a weighing system used to weigh trains of less than 5 cars, no single car weight within the group may exceed the static maintenance tolerance. <p>Uncoupled-in-Motion Railroad Weighing Systems. – The maintenance and acceptance tolerance values for any single weighment within a group of non-interactive (i.e. uncoupled) loads, the weighment error shall not exceed the static maintenance tolerance.</p>	As above.
	R106-1, 2.10	There is no technical reason to limit the display and recording of speed resolution to 1 km/h. Additional resolution of speed is useful in some applications.	Amended.

Member	Clause	Comment	Secretariat comments
USA	R106-1, 3.4.2	<p>The U.S. is opposed to permitting a single zero to indicate a zero balance condition when the value of the minimum increment is 10 or greater. An indication of “zero” on a digital device should provide an indication of both the status of the device and the value of the minimum increment that can be displayed. The display of a single zero provides a false indication of the value of the minimum increment when the minimum increment is 10 or greater. That is, a single zero would cause one to assume that the minimum increment is 1, 2, or 5. The U.S therefore suggests that the sentence shown below, struck through in red, not be included in the draft document.</p> <p>The U.S. believes that requirements pertaining specifically to the display of a “zero” indication on a digital device need to be included in the draft document. Requirements pertaining to a “zero” indication have already been adopted in the U.S. (NIST Handbook 44) and are offered below for consideration:</p> <ul style="list-style-type: none"> • A digital zero indication includes the display of a zero for all places that are displayed to the right of the decimal point and at least one place to the left. When no decimal values are displayed, a zero shall be displayed for each place of the displayed scale division. • A digital zero indication shall represent a balance condition that is within $\pm \frac{1}{2}$ the value of the scale division. • A digital indicating device shall either automatically maintain a "center-of-zero" condition to $\pm \frac{1}{4}$ scale division or less, or have an auxiliary or supplemental "center-of-zero" indicator that defines a zero-balance condition to $\pm \frac{1}{4}$ of a scale division or less. 	Amended. Now 3.4.3.
	R106-1, 3.4.6	System with properly designed rollback systems should be allowed to reweigh wagons. Certain applications require trimmed loads in long trains to be reweighed.	Amended. Now 3.4.5.4

Member	Clause	Comment	Secretariat comments
USA	3.4.3	<p>Requirements already adopted in the U.S., restrict weighing devices (including WIM instruments) from displaying or recording any values when the total platform load (not counting the initial dead load that has been cancelled by an initial zero-setting mechanism) is in excess of 105%. Additionally, a separate requirement, applicable to device users, prohibits the use of a device to weigh loads greater than nominal capacity. Although requirements adopted in the U.S. recognize that weighing small loads will likely result in relatively large errors, a minimum capacity is not required on WIM instruments.</p> <p>Additionally, type evaluation requirements that have been adopted in the U.S. do not permit the mass of any train engine to be recorded.</p> <p>The U.S. opposes allowing WIM instruments to indicate or record values when the gross platform load is in excess of 105%. The U.S. does not consider a “clear warning,” as referenced in document clause 3.4.3, an adequate deterrent to inhibiting users from weighing loads above capacity. The U.S. therefore offers the following U.S adopted requirements for consideration to replace the requirements proposed by document clause 3.4.3:</p> <p>3.4.3 Limits of indication and recorded representations</p> <p>WIM instruments shall not print the mass of any engine.</p> <p>An indicating or recording element shall not display nor record any values when the total platform load (not counting the initial dead load that has been cancelled by an initial zero-setting mechanism) is in excess of 105 % of scale capacity.</p>	Amended. Worded differently. Now 3.4.5.1.
	R106-1, 3.4.10	<p>The minimum record requirement for a WIM system used for weighing train mass should include individual wagon weights. Individual weights, even on unit train systems are required to verify total mass integrity. Suggested change shown underlined below in red:</p> <p>The minimum printout resulting from each normal weighing operation shall be the date and the time, the operating speed, and in the case of wagon weighing each wagon mass and in the case of train weighing each wagon mass and the train mass.</p>	Amended. Now 3.4.3.
	R106-1, 3.5.2	Printing cannot be inhibited in a WIM application by unstable weight. The stability requirement cannot be applied to wagons being weighed while in motion	Amended. Now 3.4.2.
	R106-1, 3.8.2	Change printer to recording device. Allow recorded weights in lieu of printed weights.	Amended.

Member	Clause	Comment	Secretariat comments
USA	R106-1, 3.8.5	<p>While the U.S. realizes the added benefit that a heat source may provide to equipment installed in very cold environments, the proposal to require a heat source raises several concerns as follows:</p> <ol style="list-style-type: none"> 1) If the rationale behind requiring a provision for a heat source is to ensure that the modules operate within the operating conditions specified by the manufacturer, then why is there not also a provision for cooling if a weighing mechanism is installed in an environment with temperatures of 40 °C or greater? 2) The U.S. questions the rationale of requiring the additional expense of a heat source if manufacturers have already designed their equipment to operate at temperatures below -10 °C. Regulations adopted in the U.S. require equipment to be suitable for the environment in which it is used and are not specific regarding how manufactures comply. Thus, although these regulations would not preclude the installation of a heat source to ensure that modules operate within the operation conditions specified by a manufacture, a heat source would not be specifically required if the equipment were designed to operate outside -10 °C to 40 °C and official on-site testing of the equipment verified proper performance of the device under conditions of normal use. <p>Alternatively, the U.S. offers the following modification for consideration:</p> <p>3.8.5 Environment</p> <p>Equipment shall be suitable for the environment in which it is used including, but not limited to, the effects of wind, weather, and RFI. If weighing equipment is to be installed in environments outside of the temperature range of -10 °C to 40 °C, it must be designed such that it continues to operate accurately at temperatures outside of that range or it must be equipped with other means such as heating (e.g., heater cable) or cooling mechanisms to ensure that equipment continues to operate within applicable requirements at all temperatures.</p>	Amended. Now 3.12.5. Worded differently.

Member	Clause	Comment	Secretariat comments
USA	R106-1, 3.10	<p>The U.S. would oppose permitting access to parameters affecting the metrological integrity by means of a code or a special device if additional security means were not also provided. Particularly in the cases of devices with remote configuration capability, the U.S. does not believe that access to these parameters by use of a code or a special device alone, provides sufficient security. The U.S. suggests dividing the requirements applicable to the sealing or securing of electronic devices based upon whether or not a device has remote configuration capability. The U.S regulatory and pattern approval requirements for devices manufactured after 1995 (other than for scales used for precision laboratory weighing) are as follows:</p> <p>Provision for Sealing</p> <p>(a) Provision shall be made for applying a security seal in a manner that requires the security seal to be broken before an adjustment can be made to any component affecting the performance of an electronic device.</p> <p>(b) A device shall be designed with provision(s) for applying a security seal that must be broken, or for using other approved means of providing security (e.g., data change audit trail available at the time of inspection), before any change that detrimentally affects the metrological integrity of the device can be made to any electronic mechanism.</p> <p>(c) Audit trails shall use the format set forth in the following table</p> <p>A device may be fitted with an automatic or a semi-automatic calibration mechanism. This mechanism shall be incorporated inside the device. After sealing, neither the mechanism nor the calibration process shall facilitate fraud.</p>	Amended. Now 3.14. Worded differently. See 3.13, 3.14 and 4.2.5.

Member	Clause	Comment	Secretariat comments										
USA	R106-1, 3.10 continued	<table><tr><th colspan="2">Categories of Device and Methods of Sealing</th></tr><tr><th>Categories of Device</th><th>Method of Sealing</th></tr><tr><td>Category 1: No remote configuration capability.</td><td>Seal by physical seal or two event counters: one for calibration parameters and one for configuration parameters.</td></tr><tr><td>Category 2: Remote configuration capability, but access is controlled by physical hardware. The device shall clearly indicate that it is in the remote configuration mode and record such message if capable of printing in this mode.</td><td>The hardware enabling access for remote communication must be at the device and sealed using a physical seal or two event counters: one for calibration parameters and one for configuration parameters.</td></tr><tr><td>Category 3: Remote configuration capability access may be unlimited or controlled through a software switch (e.g., password).</td><td>An event logger is required in the device; it must include an event counter (000 to 999), the parameter ID, the date and time of the change, and the new value of the parameter. A printed copy of the information must be available through the device or through another on-site device. The event logger shall have a capacity to retain records equal to ten times the number of sealable parameters in the device, but not more than 1000 records are required. (Note: Does not require 1000 changes to be stored for each parameter.)</td></tr></table>	Categories of Device and Methods of Sealing		Categories of Device	Method of Sealing	Category 1: No remote configuration capability.	Seal by physical seal or two event counters: one for calibration parameters and one for configuration parameters.	Category 2: Remote configuration capability, but access is controlled by physical hardware. The device shall clearly indicate that it is in the remote configuration mode and record such message if capable of printing in this mode.	The hardware enabling access for remote communication must be at the device and sealed using a physical seal or two event counters: one for calibration parameters and one for configuration parameters.	Category 3: Remote configuration capability access may be unlimited or controlled through a software switch (e.g., password).	An event logger is required in the device; it must include an event counter (000 to 999), the parameter ID, the date and time of the change, and the new value of the parameter. A printed copy of the information must be available through the device or through another on-site device. The event logger shall have a capacity to retain records equal to ten times the number of sealable parameters in the device, but not more than 1000 records are required. (Note: Does not require 1000 changes to be stored for each parameter.)	Amended as above.
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Member	Clause	Comment	Secretariat comments
USA	R106-1, 3.10 continued	<p>Audit Trails – General</p> <ul style="list-style-type: none"> a Adequate provision shall be made to apply a physical seal without exposing electronics. b If the device has a junction box that has calibration adjustments, it must be sealable. c Event counters are nonresettable and have a capacity of at least 000 to 999. d Event counters increment appropriately. e The audit trail information must be capable of being retained in memory for at least 30 days while the device is without power. f The audit trail information must be readily accessible and easily read. g Accessing the audit trail information for review shall be separate from the calibration mode. h Accessing the audit trail information must not affect the normal operation of the device. i Accessing the audit trail information shall not require removal of any additional parts other than normal requirements to inspect the integrity of a physical security seal, (e.g., a key to open a locked panel may be required). <p>Category 1 Devices (No Remote Configuration Capability)</p> <ul style="list-style-type: none"> 1. Either: <ul style="list-style-type: none"> (a) The device must be sealable with a physical security seal, or (b) the device must be equipped with at least two event counters (one for calibration and one for configuration parameters). <ul style="list-style-type: none"> - calibration parameters event counter - configuration parameters event counter <p>Category 2 Devices (Remote Configuration Capability But Controlled by Hardware)</p> <ul style="list-style-type: none"> 2. The physical hardware enabling access for remote communication is located at the device. 3. Either: <ul style="list-style-type: none"> (a) The physical hardware must be sealable with a physical security seal, or (b) the device must be equipped with at least two event counters (one for calibration and one for configuration parameters). <ul style="list-style-type: none"> - calibration parameters event counter - configuration parameters event counter 4. The device must either: <ul style="list-style-type: none"> -clearly indicate when it is in the remote configuration mode or -the device shall not operate while in the remote configuration mode. 5. If capable of printing in the calibration mode, it must print a message that it is in the calibration mode. 	Amended as above.

Member	Clause	Comment	Secretariat comments
USA	R106-1, 3.10 continued	<p>Category 3 Devices (Unlimited Remote Configuration Capability)</p> <p>Category 3 devices have virtually unlimited access to sealable parameters or access is controlled though a password.</p> <ol style="list-style-type: none"> 1. The device is equipped with an event logger. 2. The event logger automatically retains the identification of the parameter changed, the date and time of the change, and the new value of the parameter. 3. The system is designed to attach a printer which can print the contents of the audit trail. 4. The event logger must have a capacity to retain records equal to ten times the number of sealable parameters in the device, but not more than 1000 records are required. 5. The event logger drops the oldest event when the memory capacity is full and a new entry is saved. <p>In conjunction with the modifications to sealing requirements offered for consideration above, the U.S. also recommends adding a new appendix to R106-1. The proposed new appendix includes much of the philosophy supporting the regulations offered by the U.S. and further defines minimum-security requirements. The U.S. offers the following for consideration as a new appendix to R106-1:</p> <p>Requirements for Metrological Audit Trails</p> <p>Scope This discussion lists the requirements for the acceptable forms of metrological audit trail.</p> <p>The following specifications are based upon requirements outlined in document clause 3.10.</p> <p>Definitions The following definitions apply to the discussion of metrological audit trails.</p> <p>Adjustment mode. An operational mode of a device, which enables the user to make adjustments to sealable parameters, includes changes to configuration parameters.</p> <p>Adjustment. A change in the value of any of a device's sealable calibration parameters or sealable configuration parameters.</p> <p>Audit trail. An electronic count and/or information record of the changes to the values of the calibration or configuration parameters of a device. (The term addresses all forms of audit trail described in this paper.)</p>	Amended as above.

Member	Clause	Comment	Secretariat comments
USA	R106-1, 3.10 continued	<p>Calibration parameter. Any adjustable parameter that can affect measurement or performance accuracy and, due to its nature, needs to be updated on an ongoing basis to maintain device accuracy, e.g., span adjustments, linearization factors, and coarse zero adjustments.</p> <p>Configuration parameter. Any adjustable or selectable parameter for a device feature that can affect the accuracy of a transaction or can significantly increase the potential for fraudulent use of the device and, due to its nature, needs to be updated only during device installation or upon replacement of a component, e.g., division value (increment), sensor range, and units of measurement.</p> <p>Enabling/inhibiting sealable hardware. Physically sealable hardware, such as a two-position switch, located on a remotely configurable device, that enables and inhibits the capability to receive adjustment values or changes to sealable configuration parameters from a remote device.</p> <p>Event. An action in which one or more changes are made to configuration parameters or adjustments are made to one value (or values for a set of values) for a calibration parameter, (e.g., adjustments for a set of calibration factors to linearize device output), while in the adjustment mode. If no adjustment is made, then there is no event. In the case of a centralized audit trail, the same values for the same parameter sent to multiple devices shall be considered to be the same event. If changes are made to individual devices rather than to all attached devices, the event logger must identify both the device and the parameter that was changed.</p> <p>Event counter. A nonresettable counter that increments once each time the mode that permits changes to sealable parameters is entered and one or more changes are made to sealable calibration or configuration parameters of a device.</p> <p><i>Note: An event counter shall have a capacity of at least 1000 values [e.g., 000 to 999].</i></p> <p>Event logger. A form of audit trail containing a series of records where each record contains the number from the event counter corresponding to the change to a sealable parameter, the identification of the parameter that was changed, the time and date when the parameter was changed, and the new value of the parameter.</p> <p>Physical Seal. A physical means, such as lead and wire, used to seal a device to detect access to those adjustable features that are required to be sealed.</p>	Amended as above.

Member	Clause	Comment	Secretariat comments
USA	R106-1, 3.10 continued	<p>Remote configuration capability. Amended as above. Remote device. A device that (1) is not required for the measurement operation of the primary device or computing the transaction information in one or more of the available operating modes for commercial measurements or (2) is not a permanent part of the primary device. In the context of this paper, a remote device has the ability to adjust another device or change its sealable configurable parameters.</p> <p>Remotely configurable device. Any weighing or measuring device with remote configuration capability that permits sealable configuration or calibration parameter values to be deleted, appended to, modified, or substituted in whole or in part by downloading over any type of communications link from another device, such as a geographically local or remote console or computer, whether or not the secondary apparatus is part of the network connecting the devices.</p> <p>Seal. As a verb, to seal a device is to secure a device so that access to adjustments and other sealable parameters will be detectable.</p> <p>Sealable parameters. Calibration and configuration parameters that are required to be sealed.</p> <p>Unrestricted access to sealable parameters. Unrestricted access means that a physical security seal is not present, so that access to the sealable parameters is available from a remote device at any time at the request of an authorized operator subject to the operating status of the receiving device.</p> <p><u>Categories of Device: Three Forms of Audit Trail</u> <u>Three forms of the audit trail have been established; the form of audit trail acceptable for a device depends on the capability to adjust the device or change sealable parameters. The form that applies to a particular device depends upon the availability of remote configuration capability and, if so, whether or not there is virtually unrestricted access to the configuration or calibration parameters of the device. Three categories of device are listed below with the category designation numbered to correspond to the capability and ease of changing sealable parameters from a remote device.</u></p>	Amended as above.

Member	Clause	Comment	Secretariat comments
USA	R106-1, 3.10 continued	<p><u>Category 1. A device that does not have remote configuration capability.</u></p> <p><u>These devices may be sealed with either a physical security seal or an audit trail. If an audit trail is used, then the minimum form of audit trail must be provided (see next page).</u></p> <p><u>Category 2. If a device has remote configuration capability, but the activation of the remote configuration capability is through physical hardware (such as a switch) that can be sealed with a physical seal, then the device may be sealed using a physical seal or the minimum form of the audit trail.</u></p> <p><u>Because the event logger (see category 3 below) requires significant memory and many device manufacturers want to provide remote configuration capability for at least some of the sealable parameters, a "hybrid" form of audit trail was established. Restricted access to the hardware inhibiting and activating the remote configuration capability eliminates the need for the event logger as the form of audit trail for this category of device.</u></p> <p><u>The second category of device specifies that, when the device is in the remote configuration mode, there must be a clear and continuous indication to that effect. The objective is that the device shall not be (erroneously) sealed with the remote communication capability operational. The clear and continuous indication is intended to reduce this possibility. A "clear and continuous indication" that the device is in the remote configuration mode must be of such a nature that it discourages the use of the device for normal transactions when in this mode. This may be a partial obscuring of the numbers, an alternating display message, or some other obvious indication. The lighting of an annunciator is not sufficient. If values can be printed when in the configuration mode, the system shall record a message to indicate that the system is in the configuration mode. Manufacturers may want to display decipherable information because the scale will be in this mode of display when it is tested, and the indicated weight values may be needed for reference when adjusting the scale.</u></p> <p><u>Category 3. A device that allows virtually unrestricted access to configuration parameters or calibration parameters must have an event logger as its minimum form of the audit trail.</u></p> <p><u>An event logger contains detailed information on the parameters that have been changed and documents the new parameter values. An event logger requires a significant amount of memory; however, it is anticipated that any device to which unrestricted access is given, will be part of sophisticated measurement process that will have considerable memory available. A centralized audit trail may be used, but additional criteria apply.</u></p>	Amended as above.

Member	Clause	Comment	Secretariat comments										
USA	R106-1, 3.10 continued	<p><u>Scales Code: Provision for Sealing.</u></p> <p><u>(a) Provision shall be made for applying a security seal in a manner that requires the security seal to be broken before an adjustment can be made to any component affecting the performance of an electronic device.</u></p> <p><u>(b) A device shall be designed with provision(s) to apply a security seal that must be broken, or for using other approved means of providing security (e.g., data change audit trail available at the time of inspection), before any change that affects the metrological integrity of the device can be made to any electronic mechanism.</u></p> <p><u>(c) Audit trails shall use the format set forth in the category of devices and methods of sealing in clause 3.10.</u></p> <p><u>A device may be fitted with an automatic or a semi-automatic calibration mechanism. This mechanism shall be incorporated inside the device. After sealing, neither the mechanism nor the calibration process shall facilitate fraud.</u></p> <table><tr><th colspan="2">Categories of Device and Methods of Sealing</th></tr><tr><th>Categories of Device</th><th>Method of Sealing</th></tr><tr><td>Category 1: No remote configuration capability</td><td>Seal by physical seal or two event counters: one for calibration parameters and one for configuration parameters.</td></tr><tr><td>Category 2: Remote configuration capability, but access is controlled by physical hardware. Device shall clearly indicate that it is in the remote configuration mode and record such message if capable of printing in this mode.</td><td>The hardware enabling access for remote communication must be at the device and sealed using a physical seal or two event counters: one for calibration parameters and one for configuration parameters.</td></tr><tr><td>Category 3: Remote configuration capability access may be unlimited or controlled through a software switch (e.g., password)</td><td>An event logger is required in the device; it must include an event counter (000 to 999), the parameter ID, the date and time of the change, and the new value of the parameter. A printed copy of the information must be available through the device or through another on-site device. The event logger shall have a capacity to retain records equal to ten times the number of sealable parameters in the device, but not more than 1000 records are required. (Note: Does not require 1000 changes to be stored for each parameter.)</td></tr></table>	Categories of Device and Methods of Sealing		Categories of Device	Method of Sealing	Category 1: No remote configuration capability	Seal by physical seal or two event counters: one for calibration parameters and one for configuration parameters.	Category 2: Remote configuration capability, but access is controlled by physical hardware. Device shall clearly indicate that it is in the remote configuration mode and record such message if capable of printing in this mode.	The hardware enabling access for remote communication must be at the device and sealed using a physical seal or two event counters: one for calibration parameters and one for configuration parameters.	Category 3: Remote configuration capability access may be unlimited or controlled through a software switch (e.g., password)	An event logger is required in the device; it must include an event counter (000 to 999), the parameter ID, the date and time of the change, and the new value of the parameter. A printed copy of the information must be available through the device or through another on-site device. The event logger shall have a capacity to retain records equal to ten times the number of sealable parameters in the device, but not more than 1000 records are required. (Note: Does not require 1000 changes to be stored for each parameter.)	Amended as above.
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Member	Clause	Comment	Secretariat comments				
USA	R106-1, 3.10 continued	<p><u>Minimum Form of the Audit Trail</u></p> <p><u>The minimum form of the audit trail shall consist of two event counters; one for configuration parameters and one for the adjustment (calibration) parameters (000 to 999 for each counter).</u></p> <p><u>The maximum number of values or parameters that must be retained in event logger memory is 1000. (This limit may not apply to centralized event loggers. See the section titled "Centralized Event Loggers" for details.)</u></p> <p><u>Event Loggers: Acceptable Form of Audit Trail for Category 3 Devices</u></p> <p><u>1. The event logger is the minimum form of audit trail for Category 3 devices (those that have unrestricted remote access to the configuration or calibration parameters.) The event logger shall contain the following information:</u></p> <table border="1"> <tr> <td><u>Event counter</u></td><td><u>Date and time</u></td><td>Parameter ID</td><td>New value.</td></tr> </table> <p><u>2. This information shall be automatically entered into the event logger by the device. In the case of centralized event loggers, the parameter identification shall include the device identification to which the event applies. Additional relevant information is permitted, e.g., the identification of the person who made the adjustment or the old value of the parameter that was changed.</u></p> <p><u>3. The date and time shall be presented in understandable format. The date shall include month, day, and year. The time shall include the hour and minutes.</u></p> <p><u>4. A hard-copy printout of the contents of the event logger shall be available upon demand from the device or an associated device on the site of the device installation. The display or printing of the event logger contents shall exclude other nonmetrological information, such as transaction data, operator inventory records, shift totals, etc.</u></p> <p><u>5. An event logger shall retain a minimum of 10 entries for each sealable parameter; it is not required to retain more than 1000 events for all parameters combined. This limit applies to devices for which the event logger is dedicated to a single device (See the section titled "Centralized Event Loggers").</u></p>	<u>Event counter</u>	<u>Date and time</u>	Parameter ID	New value.	Amended as above.
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Member	Clause	Comment	Secretariat comments
USA	R106-1, 3.10 continued	<p><u>Centralized Event Logger</u></p> <p><u>Remote configuration will be used most frequently when several devices are interfaced with a host computer or other host device. A centralized event logger may be used when several "satellite" devices are interfaced with a host device. The following criteria must be satisfied if a centralized event logger is to be used:</u></p> <ol style="list-style-type: none"> <u>1. If electronic parameters monitored by the event logger are changed at the device rather than through the device containing the centralized audit trail, the changes shall be transferred to and maintained in the centralized audit trail. It shall not be possible to circumvent the unit containing the audit trail. For example, if the audit trail unit is disconnected or inhibited, the attached network devices shall be inoperable and impossible to adjust electronically when in the network configuration. Mechanical adjustments are not expected to be monitored by the event logger because there will probably not be an electrical connection from the mechanical adjustment to the event logger. Sealable mechanical adjustments must be secured by a physical security seal.</u> <u>2. If the same values for change to a parameter (e.g., the division value for scales) are sent from the host device to several satellite devices, this shall be represented as one event in the logger. If changes are made to individual devices rather than to all attached devices, the event logger shall identify both the parameter and the device that was changed. Identification may be by individual devices, groups of devices, or designated as all devices.</u> <u>3. If a device can be installed in a stand-alone operation, it must have the minimum form of audit trail when installed in the stand-alone mode.</u> <u>4. A system shall be capable of providing, on demand, a hard copy of the event logger through the device or through another on-site device. The display or printing of the event logger contents shall exclude other non metrological information such as transaction data, operator inventory records, shift totals, etc.</u> <u>5. If a centralized audit trail is used for a large number of devices on a network, the logger capacity of 1000 events is not sufficient in this case, at least 1000 events per device is required.</u> 	Amended as above.

Member	Clause	Comment	Secretariat comments
USA	R106-1, 3.10 continued	<p><u>General Requirements for Metrological Audit Trails</u></p> <p><u>When an audit trail is the form of security, minimum forms of audit trail are specified for different categories of devices. The following general requirements for metrological audit trails must be satisfied as part of all three minimum forms of audit trail.</u></p> <ol style="list-style-type: none"> 1. <u>The adjustment mode shall address only sealable parameters in order to avoid entering the adjustment mode to access non-sealable parameters that must be routinely changed as part of the normal use of the device. Because the audit trail requirements are intended to satisfy the weights and measures requirements of the U.S. and Canada, any parameters required to be sealed in one country, but not the other, may be included in the adjustment mode and still comply with this requirement. Manufacturers should consult with the weights and measures authority to discuss those parameters that may be questionable as to whether or not the parameter must be sealed. Manufacturers may choose to incorporate the capability to set a software "switch" that determines whether or not a parameter is sealable. If this is done, then the software switches (that determine whether or not a parameter is sealable) shall be sealable.</u> 2. <u>When a remotely configurable device is in the remote configuration mode, that is, capable of receiving changes to sealable parameters, the device shall either:</u> <ol style="list-style-type: none"> a. <u>not indicate or record (if equipped with a printer); or</u> b. <u>provide a clear and continuous indication that it is in remote configuration mode. Any printed ticket or receipt shall include a message with each ticket or receipt that the device is in the calibration mode.</u> <p><u>A "clear and continuous indication" that the device is in the remote configuration mode must be of such a nature that it discourages the use of the device for normal transactions when in this mode. This may be a partial obscuring of the numbers, an alternating display message, or some other obvious indication. The lighting of an annunciator is not sufficient. If values can be printed when in the configuration mode, the system shall record a message to indicate that the system is in the configuration mode.</u></p> 	Amended as above.

Member	Clause	Comment	Secretariat comments
USA	R106-1, 3.10 continued	<p><u>3. An event counter shall have a capacity of at least 1000 values, (e.g., 000 to 999).</u></p> <p>a. <u>The event counter for calibration parameters shall increment only when a change is made to at least one sealable calibration parameter during an event (during the time when in the adjustment mode); the counter shall increment only once regardless of the number of changes made while in the adjustment mode. When the calibration mode is entered, but no changes are made, this does not constitute an event and the counter must not increment.</u></p> <p>b. <u>The event counter for configuration parameters shall increment only when a change is made to at least one sealable configuration parameter during an event (during the time when in the configuration mode); the counter shall increment only once regardless of the number of changes made while in the configuration mode. When the configuration mode is entered, but no changes are made, this does not constitute an event and the counter must not increment.</u></p> <p>c. <u>In the case of the event logger, the event counter shall increment once for each change to a sealable parameter since each new value must be retained in the event logger.</u></p> <p><i><u>Note: The criteria in items 3(a) and 3(b) specify the minimum requirements for event counters. A device may have a separate event counter for each sealable parameter in this case, the corresponding event counter must increment once each time its sealable parameter is changed.</u></i></p> <p><u>4. When the storage memory of the event logger has been filled to capacity, any new event shall cause the oldest event to be deleted. The event counter provides the necessary information to indicate the number of records that have been overwritten in the event logger as new information overwrites the old records.</u></p> <p><u>5. The audit trail data shall be:</u></p> <p>a. <u>stored in non-volatile memory and shall be retained for at least 30 days if power is removed from the device; and</u></p> <p>b. <u>protected from unauthorized erasure, substitution, or modification.</u></p>	Amended as above.

Member	Clause	Comment	Secretariat comments
USA	R106-1, 3.10 continued	<p><u>6. Access to the audit trail information for the purpose of viewing or printing the contents must be "convenient" for the enforcement official.</u></p> <p><u>a. Accessing the audit trail information for review shall be separate from the calibration mode so there is no possibility for the weights and measures official to change or corrupt the device configuration or the contents of the audit trail.</u></p> <p><u>b. Accessing the audit trail information shall not affect the normal operation of a device before or after accessing the information.</u></p> <p><u>c. A key (for a panel lock) may be required to gain access to the means to view the contents of the audit trail. Access may be through the supervisor's mode of operation of the device.</u></p> <p><u>d. Accessing the audit trail information shall not require the removal of any additional parts other than normal requirements to inspect the integrity of a physical seal.</u></p> <p><u>7. The displayed or printed form of the audit trail information shall be readily interpretable by the inspector.</u></p> <p><u>8. The information from an event logger shall be displayed or printed in order from the most recent event to the oldest event. If a device is not capable of displaying all the information for a single event on one line or at one time, the information shall be displayed in blocks of information which are readily understandable.</u></p>	Amended as above.
	R106-1, 3.12.2	Remove the reference to "a strip of lead". Lead is no longer always used for sealing or marking.	Amended.
	R106-1, 5.1.3.2	There are two document clauses identified as 5.1.3.2. The second one is assumed to be 5.1.3.3. Additionally, 5.2.3_ a) and b) on page 41 should reference 5.1.3.3.1 and 5.1.3.3.2, respectfully.	Amended.

Member	Clause	Comment	Secretariat comments
USA	R106-1, 6.1, 6.1.1, 6.6, A.9.3.3.1	<p>The U.S. notes that the requirements listed in document clause 6.1.3, permitting multi-draught (“partial”) weighing appear to contradict those listed in document clauses 6.1, 6.1.1, 6.6, and A.9.3.2.1 which require full-draught weighing. The U.S. suggests modifying document clauses 6.1, 6.1.1, 6.6, and A.9.3.2.1 as follows to correct the contradiction.</p> <p>6.1 Control instrument for reference wagon weighing</p> <p>A control instrument for determining the conventional true value of each reference wagon mass shall be available for testing. The control instrument may be either separate or integral. The conventional true value of each reference wagon mass shall be determined when the wagon is stationary and uncoupled.</p> <p>6.1.1 Separate control instrument</p> <p>A control instrument, separate from the instrument being tested shall ensure the determination of the conventional true value of each reference wagon mass to an accuracy of at least one-third of the maximum permissible error for weighing-in-motion specified in 2.2.1.</p> <p>6.6 Conventional true value of the reference wagons mass</p> <p>The conventional true value of each reference wagon mass shall be determined by full draught or multi-draught weighing on a suitable control instrument, as detailed in A.9.3.2.1.</p> <p>A.9.3.2.1 Weighing of reference wagons</p> <p>The conventional true value of the reference mass (uncoupled, coupled or total train) shall be determined by full-draught weighing of the reference wagons with the appropriate load conditions on a suitable control instrument unless a scale of suitable length to full-draught weigh the reference wagons is unavailable. In this case the reference wagons may be multi-draught weighed using the procedures outlined in clause A.9.3.2.2</p>	Amended. Worded differently. Clause A.9.3 amended.

Member or liaison group	Clause	Comment	Secretariat comments
USA	R106-1, 6.1.3	<p>The U.S. proposes that multi-draught weighing of reference wagons only be permitted when a scale of sufficient length to single draught weigh the reference wagons is <u>not</u> readily available.</p> <p>As noted in previous comment, the U.S. suggests replacing the phrase “partial weighing” as indicated in 6.1.3 with the term “multi-draught weighing”. Additionally, to account for the various wagon types found in many countries, the U.S. proposes that the document clause include sufficient language allowing the mass of reference wagons having four axles be determined by summing the results of weighing both axles of each bogie simultaneously, providing the following conditions are met:</p> <ol style="list-style-type: none"> 1) The approach rails shall be in the same plane and alignment as the weighrails and shall be properly anchored; 2) Approach and scale rails shall be the same weight. Rail shall be continuous with no joints on the scale or approaches; and 3) The reference wagons are completely uncoupled when the mass of each bogie is determined <p>Use of the term “whichever is the smaller of the appropriate MPE” indicated in the lower bulleted sentence in document clause 6.1.3 is unclear. Regulations adopted in the U.S. require that the accuracy of standards used in testing commercial weighing and measuring equipment be established and maintained so that the use of corrections is not necessary. When the standard is used without correction, its combined error and uncertainty must be less than one-third of the applicable device tolerance. The U.S. believes that regardless of whether reference wagons are weighed on a separate control instrument or a control instrument for partial weighing of two-axle wagons, the degree of accuracy in the weighing of the reference wagons should be held to the same standard (i.e., the combined error and uncertainty must be less than one-third of the applicable device tolerance). The U.S., therefore, suggests modifying the lower bulleted sentence so that the language is consistent with the language used in document clause 6.1.1. Suggested modifications are shown in red below:</p>	<p>Amended. Text inserted in A.9.3.1.3 referencing Annex C.</p> <p>Amended. Now 3.11.</p>

Member or liaison group	Clause	Comment	Secretariat comments
USA	R106-1, 6.1.3 additional comment	<p>6.1.3 Control instruments for partial weighing of two-axle wagons</p> <p>An instrument constructed only for partial weighing of two-axle wagons may be used as the control instrument (separate or integral) for determining the conventional true value of the reference wagon mass by individual axle measurement when stationary provided that:</p> <ul style="list-style-type: none"> the alignment correction or exemption test for partial weighing instruments in Annex B has been successfully applied. it ensures the determination of the conventional true value of the static two-axle reference wagon mass to an accuracy of at least one-third of the maximum permissible error for weighing-in-motion specified in 2.2.1. 	Amended. Now 3.11.
	R106-1, 6.2	<p>The working draft revision includes technical requirements (clause 3.7) and static weighing tests (clauses 6.2, A.9.3.1) for integral control instruments. The U.S. could not find similar technical requirements or tests specified for separate control instruments in the draft document. The U.S. questions whether or not they should be included in the document for both types of control instruments.</p> <p>The U.S. views inspection and testing of the scale used to weigh reference wagons in preparation of in-motion testing, whether integral or separate control instrument, an important step in the overall test of an in-motion railroad scale system. The U.S therefore believes that regardless of whether the control instrument is integral or separate, it should be tested and it's accuracy verified to within a specific degree (i.e., tolerance) before it is used to weigh reference wagons. Additionally, an inspection should be conducted to verify that the design and installation of the scale are adequate and make possible weighing results that are sufficiently accurate enough for use in performing an in-motion railroad scale test. Testing and inspection of the scale used to weigh reference wagons should be conducted just prior to the weighing of the reference wagons that are to be used for the in-motion test of a railroad scale system.</p>	Amended. See 3.11, 6.1.1.
	R106-1, 6.4	<p>The word "that" is duplicated in the first sentence on page 45. Delete the duplicated word as follows:</p> <p>Wagons carrying liquid loads or other products that may be subjected to fluctuations in its gravity centre when the wagon moves, shall be used as reference wagons only if the WIM instrument will be applied subsequently for determining the mass of such wagons.</p>	Amended.

Member or liaison group	Clause	Comment	Secretariat comments
USA	R106-1, 6.4.1, 6.4.2	The U.S. suggests adding the term “In-motion tests “ to the beginning of the titles of each document clause to improve clarification as follows: 6.4.1 In-motion tests - single (uncoupled) wagon 6.4.2 In-motion tests - coupled wagon or train weighing	Amended.
	R106-1, 6.4.2	Additional words need to be added to the first sentence of the document clause to make it a true sentence. The U.S. suggests adding the following words: A minimum of five (and normally not more than fifteen) reference wagons are required in a test train.	Amended in accordance with Romania’s proposals.
	R106-1, 6.5	The word “to” was missed at the end of the sentence as follows: Each reference wagon shall undergo a minimum of five test runs conducted at operating speeds (T.5) that are within the range of speeds for which the instrument is to be evaluated.	Amended as above.
	R106-1, A.5.2.3	There should be a minimum value specified for the test standard used to perform an eccentricity test on a WIM system. For weighing loaded wagons, the minimum test standard value should be not less than 36t. This change would improve the harmonization of international test procedures with those employed in the U.S.	Amended. Worded differently. For weighing loaded wagons, the minimum test standard value is the fraction 1/n of max for load receptors with $n \leq 4$.
	R106-1, A.5.2.4	The U.S. suggests changing the division size in the example from 10 g to 10 kg. This would provide a better example d for a WIM system.	Amended.
	R106-1, A.6 thru A.8	These tests cannot be performed in-situ and must be performed in a lab environment although this is not clearly stated in the draft document.	See A.4 for test program.
	R106-1, A.9.3.2.2	The second paragraph needs to be re-written to allow the weighing of reference wagons in multi-draught weighing using the least possible draughts to weight the entire wagon. Modification needed to allow the use of four-axle reference wagons typically used by a number of countries as suggested in U.S. comments already provided for clause 6.1.3.	Amended. Worded differently.
	R106-1, A.9.3.2.3	Weighing wagons to determine reference weights multiple times will not produce different results on a properly installed scale and is an unnecessary commitment of assets.	A.9.3.2.3 deleted.
	R106-1, A.9.3.2.3 1)	The clause references A.9.3.1.3 and it is assumed that A.9.3.2.2.2 should have instead been referenced.	Amended as above.

Member or liaison group	Clause	Comment	Secretariat comments
USA	R106-1, A.9.3.2.3_2)	<p>The “3” indicated at the top of the summation notation should instead be a “5” to correctly represent the number of times each single axle is weighed in accordance with the sentence appearing in A.9.3.2.3_1). The U.S. suggests the following change:</p> <p>2) Calculate the mean static reference axle-mass for each axle:</p> $\overline{\text{Axle}_i} = \frac{\sum_1^3 \text{Axle}_i}{5}$ <p style="text-align: right; color: red;">Change to the number 5</p>	A.9.3.2.3 deleted.
	R106-1, A.9.3.2.3_3)	The formula for the wagon total should be “wagon _i ” and the word “Axle” should be changed to “Bogie.” The U.S. also suggests adding a note making clear that some wagons will have four axles (i.e., two bogies each having two axles)	
	R106-1, A.9.3.3.1	<p>Test runs should be completed at minimum, maximum and typical operating speeds. Additional test runs can be completed at any speed that is within the operating range of the system. The U.S. therefore suggests modifying the last sentence as follows:</p> <p style="color: blue;">All test runs shall be conducted at operating speeds that are within the range of speeds for which the instrument is be evaluated, with at least one test run close to the:</p> <p>(i) maximum operating speed (s_{\max}), (ii) minimum operating speed (s_{\min}) (iii) typical site operating speed.</p>	Amended.
	R106-1, A.9.3.3.3	<p>The mean mass of a wagon should take into account all valid runs of the train and not just those at typical operating speed. The U.S. suggests the following modification:</p> <p style="color: blue;">A.9.3.3.3 Coupled-wagon weighing (5.1.3.2.2)</p> <p style="color: blue;">(1) For each coupled reference wagon, record the mass of the individual wagons as indicated or printed by the instrument under test. Calculate the mean mass of each individual wagon using the results of valid test runs.</p>	Amended. See A.9.3.2.2.
	R106-1, A.9.3.3.3 (2)	The term “Coupled wagon” is not defined and the application of this formula is unclear. The “where” definition is also unclear. The U.S. suggests rewriting this item for clarity.	
	R106-1, A.9.3.3.3 (3)	The phrase “determined by full-draught weighing” should be changed to “determined by full-draught or multi-draught weighing” to make the sentence consistent with both means for determining reference wagon mass.	

Member or liaison group	Clause	Comment	Secretariat comments
USA	A.9.3.3.3 (4)	The U.S. questions whether or not the last sentence of A.9.3.3.3 (4) is correctly stated because it appears that A.9.3.2.1 permits the conventional true value of the reference mass of the wagons to be determined while the wagons are either <u>uncoupled</u> or <u>coupled</u> . Additionally, document clause 6.1.1 (applicable to a separate control instrument) requires the conventional true value of the reference mass to be determined when the wagons are stationary and <u>uncoupled</u> . The U.S. was unable to locate any specific reference in the document clause suggesting that the reference wagons needed to be statically weighed while coupled. If these assertions are correct, the U.S. suggests deleting the entire sentence because it is restated in (5) a).	Amended. See A.9.3.2.2.
	R106-1, B.2	Rail alignment of +/- 1mm over the distance of 25m is unnecessarily restrictive and not required for accurate static weighing. The U.S. suggests changing the Rail alignment of +/- 1mm to +/- 2mm.	Amended
	R106-1, C.5	The word "shall" should be changed to "should" because in certain applications, the WIM system is installed to provide instant feedback to a loading operator and may be under the loading structure.	Amended